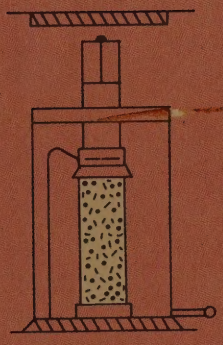
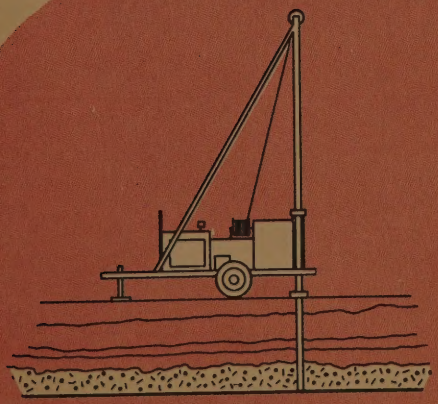
Wm. P. Hofmann

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

SOIL MECHANICS BUREAU

JANUARY 1971





SUBJECT

THE EVALUATION OF SHOULDERS

IN FOUR COUNTIES

SM 238a (1/69)

MEMORANDUM

DEPARTMENT OF TRANSPORTATION

DATE March 21, 1972

SUBJECT "EVALUATION OF SHOULDERS IN FOUR COUNTIES" REPORT

FROM R. J. Weaver, Associate Soils Engineer, Soil Mechanics Bureau

TO W. P. Hofmann, Director, Soil Mechanics Bureau

cc G. W. McAlpin, Technical Services Subdivision, Room 213, Bldg. 7
W. C. Burnett, Eng. Res. & Dev. Bureau, Exec. Park, Stuyvesant Plaza

As requested, we have reviewed the unsigned comments from the Engineering Research and Development Bureau on the subject report.

We find in favor of Mr. Moody et al, who in our opinion, did an excellent job. From our analysis, no corrections, amplifications or changes in the expressed conclusions are warranted or justified.

Our detailed review, prepared by Mr. Lamb, is attached.

RJW/bjg
Attachment (1)

NYSDOT
Library
50 Wolf Road, POD 34
Albany, New York 12232

REVIEW OF COMMENTS FROM ER&D BUREAU ON THE REPORT "EVALUATION OF SHOULDERS IN FOUR COUNTIES"

We are surprised by the apparent view held by the author that all data lends itself to statistical analyses and that statistical analyses are always necessary to make valid conclusions. The maintenance data were basically collected from the memories of County Resident Engineers and the remaining data, except for the Present Serviceability Rating, were obtained from a review of the contract plans. Since we were not working with a number of equally good observations that are truly representative of each measured quantity, we did not plunge into inappropriate mathematical analyses.

The following comments are presented regarding the regression equations in the critique.

(1) The author stated that he included in the regression analyses, all shoulders whose only maintenance had been patching. A review of the data, including only 59W mixed in a pugmill, shows the following discrepancies: 22 shoulders of 4 inches 59W and 3 of 3 inches 59W with SST for a total of 25 instead of 15 shoulders; 4, not 5, shoulders of 4 inches 59W with DST; 1 shoulder with 3 inches 59W and 1 inch 51 and 4 shoulders with 4 inches 59W and 1 inch 51 for a total of 7 shoulders, not 8; and 5 shoulders with 3 inches 45SP and 1 inch 51 and 1 shoulder with 4 inches 45SP and 1 inch 51 for a total of 9 shoulders, not 7.

(2) The age of the shoulders was not presented in the report. The contract letting date was included. However, the shoulder could be placed one, two, or even three years later. Therefore, the age of the shoulder is not known and should not be used as the independent variable in a simple regression.

(3) Based on comments (1) and (2) above, the equations are questionable, to say the least.

The following refer to the reviewer's comments:

Conclusions

(1) The conclusion was based on the findings in four counties.

(2) Although there were no spring surveys, the evidence of a bearing capacity failure would still exist unless main-

tenance had corrected the situation.

(3) This statement is based on previous observations. However, as previously indicated, the author was unaware of the facts surrounding the data presented in this report.

(4) A useful shoulder life is the number of years a shoulder has a PSR of 2.5 or higher and remains relatively maintenance free.

(5) Single surface treatments are recommended for major maintenance (i.e., complete shoulder refurbishing) since it is expected to be performed once prior to a scheduled overlay of the pavement surface. A single surface treatment is more economical to perform when compared to the alternate of shoulder reconstruction. Also, when the pavement surface is overlaid, the shoulder would be covered since it would be impractical to build up a shoulder approximately 2½ inches with surface treatments. Therefore, this recommendation is an advantageous and economical method for upgrading the previous shoulder designs.

(6) The charts plainly indicate that Contract SH 66-15 was not open to the public and therefore was new or unused. Contracts up to four years old have been patched and the extent is not known due to the record keeping systems utilized at the Resident levels. It is true that projects would be higher than 4.0 when back projecting at the average rate of 0.4/yr. However, SH 66-15 had a PSR of 4.3. Comments on the regression equations have been previously stated. Refer to comment (2) of these regarding the ages of the shoulders.

(7) A back-projection of the type made by the author would require information of a more precise nature than is available from the report. His findings result from the wide latitude exercised in the analysis of the data.

Recommendations

Design

(1) The author is relying on the results of a regression analysis that has a correlation coefficient of 0.09 and indicates the shoulder PSR increases with time. The recommendation for 3 inches of 59W was based on past experience.

(2) We did not "admit" that a full evaluation of double surface treatment is not yet possible but stated that one had not been made. See previous comments for regression analyses.

(3) Based on previous experience.

(4) No comment.

(5) I agree. The reason is that 59W is mixed in a pugmill and the cost of setting up a plant makes it uneconomical to process less than the minimum quantity.

Maintenance

(1) One that protects the base course. Refer to Number 5 under Conclusions regarding the use of single surface treatments.

(2) "To program" does not mean "to apply". Also refer to our comments regarding the regression analyses, expecially Number 2.

General

(1) Training people to do a proper PSR would not be difficult after a Departmental policy is established on who would do the PSR's. The author's indication of a wide variation in maintenance limits due to the individuality of the raters can be controlled to meet predetermined limits.

(2) This report was published because of an imposed time schedule. The additional work cannot be completed at this time because of insufficient time and money.

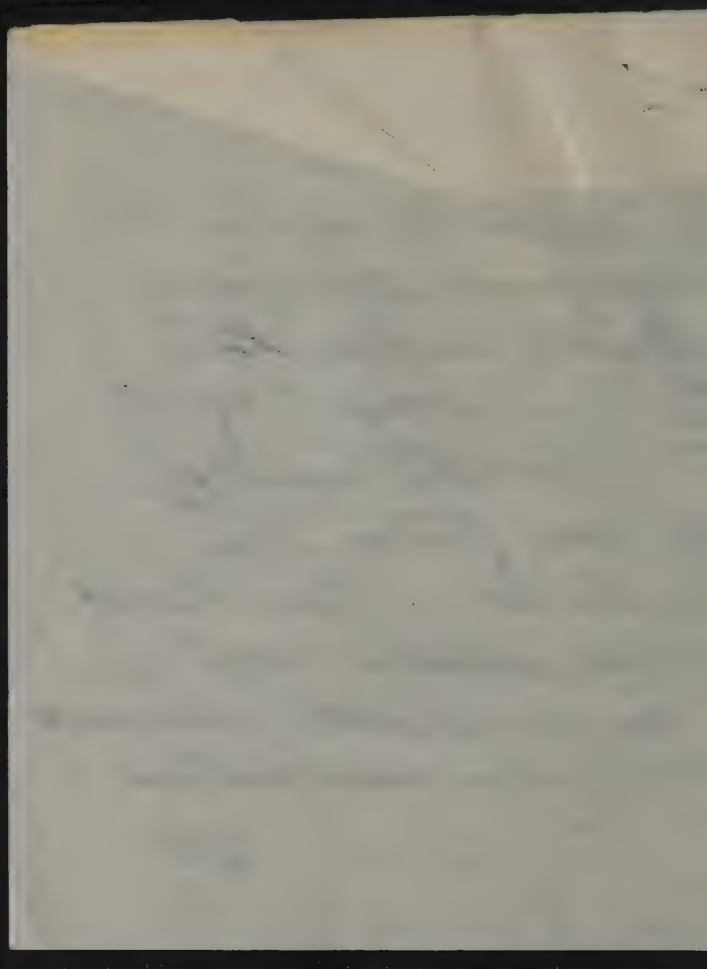
The author's final conclusion may be correct but there is no evidence that the savings in maintenance money would (or would not) outweigh the increase in construction cost.

1/6/72

~~WPM~~ → RJW

This is from an anonymous but fairly reliable source. Give this and copy of report to RJW to analyze for our future use on shoulders. You showed resume written report from RJW with comments and recommendations.

WPS



1/6/72

Review of "The Evaluation of Shoulders in Four Counties"
Soil Mechanics Bureau
January, 1971

I read the subject report as an informational paper but found a number of ill-conceived and poorly supported conclusions and recommendations. This was surprising because there was enough data collected to make valid conclusions. However, no statistical analyses were presented, and many important points, for which there was data, were presented as observations.

I realize that this is closing the barn door after the horse is out because several directives have been issued from the Chief Engineers office based on this report. However, the criticisms offered here seem important enough to be brought to your attention for several reasons.

One is that more thought may be given to making further changes based on this report and changes already made may be reconsidered. The second is an object lesson in the amount of time spent analyzing data. It appears that a considerable amount of time and effort went into the planning, scheduling, and collecting of the data, then the conclusions and recommendations were made based on observations and opinions.

The first point is that "apparent rates of decline" are mentioned a number of times, apparently by determining a best fit line through data points by eye. I took all shoulders that had nothing more than patching done on them and ran regression analyses of age vs. PSR. The results are shown below.

Shoulder	N	R	Equation	Yrs. To PSR of 2.5
59W and SST	15	-0.92	P = 6.02 - 0.59 Age	6
59W and DST	5	-0.76	P = 4.76 - 0.24 Age	9
59W and 51	8	-0.77	P = 4.98 - 0.14 Age	18
45SP and 51	7	0.09	P = 4.15 + 0.03 Age	---

These equations show that some of your conclusions are valid, generally those dealing with which shoulder surface is best. However, where useful shoulder life and the degree of improvement achieved by one type over another are concerned, these equations don't support your reported findings.

The following specific comments deal directly with your conclusions and recommendations starting on page 7.

Return to Wm. P. Hofmann

Conclusions

1.) This is not a conclusion, but a finding which should be mentioned in the body of the report and emphasized because economics would seem to be the most important consideration.

2.) This doesn't mean much because none of your surveys were made during the critical spring survey where this type of deficiency would most likely appear.

3.) What is this statement based on? I found there were nowhere near enough 3" shoulders to make any such statement. I went back eight years (two of your 4-year maintenance cycles) to 1962 and found only four 3" - 59W shoulders and 44 of the 4" ones. Of the four 3" ones; one has not been surface treated yet but has averaged $1600/yr in patching (five - 4" ones in the same county have averaged $175/yr in patching), two have done well and the fourth was resurfaced in four years, sooner than any 4" shoulder.

4.) What is a useful shoulder life and what do the single surface treated ones average?

5.) How can you recommend single surface treatment for major maintenance and not for new pavements? Also, how about shoulders other than 59W?

6.) How do you know? Your charts don't indicate any new ones were rated! Also, those up to 4 years old that have not been resurfaced, for the most part, would be higher than 4.0 if you use 0.4/yr and project backwards.

You also say that the four-year cycle is good, but the regression equations indicate that the average life, within very small limits, is six years. In fact, the data is very clear on this. Of the fifteen shoulders of this type, eight were less than 6-years old, one was six and six were older. One of the eight newer ones was below 2.5 but the average PSR of the other seven (4 and 5 years old) was 3.4, while the six-year old shoulder had a PSR of 2.7 and the six older ones (7 and 8 years old) had an average PSR of 1.6.

7.) How can you say that the PSR is not raised above 3.0 on most projects? I took all 17 pavements that had been surface treated and projected PSR's back to the year it was last surface treated, using 0.4/yr as a rate. Table 1 shows this results in an average PSR of 3.4, just after surface treated. All Figure J shows is that very few were above 3.0 at the time you surveyed them!

Recommendations

Design

1.) The regression analyses show that 45SP is better. Also, you still haven't shown any data indicating 3" of 59W is adequate.

2.) Here you equate a double surface treatment with one-inch of asphalt, yet on page 8, you admit a full evaluation of double surface treatments is not yet possible. Also, the regression analyses show asphalt to be much better than the D.S.T.

3.) How can you recommend two shoulder designs that weren't even studied?

4.) No comment

Table 1

(1) County	(2) Contract	(3) 1970 PSR	(4) Last S.T.	(5) Age of S.T.	(6) (5)X(0.4)	PSR of New S.T.
Oswego	60-49	2.8	'66	4	1.6	4.4
"	61-48	2.5	'68	2	0.8	3.3
"	61-142	2.8	'70	0	0	2.8
"	62-18	3.5	'69	1	0.4	3.9
"	61-90	3.2	'70	0	0	3.2
"	61-92	1.9	'67	3	1.2	3.1
"	64-35	1.9	'70	0	0	1.9
"	65-140	3.3	'70	0	0	3.3
Albany	61-6	3.8	'67	3	1.2	5.0
	61-24	3.4	'66	4	1.6	5.0
Broome	60-3P	3.0	'70	0	0	3.0
	60-4	2.7	'70	0	0	2.7
	60-121	3.2	'70	0	0	3.2
	61-11	2.4	'70	0	0	2.4
	61-168	3.1	'70	0	0	3.1
	63-24	3.2	'70	0	0	3.2
	63-27	3.3	'67	3	1.2	4.5

For Oswego and Albany $\bar{X}$ = 3.6

For Broome $\bar{X}$ = 3.2

= 58.0

N = 17

$\bar{X}$ = 3.4

5.) Why a minimum quantity limit for the 59W? Your reasons are probably valid, but they should be given.

(1)	(2)	(3)	(4)	(5)
Country	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]

Maintenance

1.) Whats an adequate wearing course? If SST is no good for new shoulders, why use it on older ones?

2.) Whether it needs it or not? If you do, then why adopt PSR for shoulders as recommended in "General" #1. Also, by not specifying, you've included D.S.T.'s here which, earlier, you equated with asphalt concrete and which the regressions show to last 50% longer than S.S.T. In addition, the five D.S.T.'s used in the regression had an average age of 4-years which means they should be worked on, but their average PSR was 3.8.

General

1.) Who will do your PSR's? How much shoulder work is done will depend on who you send out.

Looking at your figures E through H, the range of ratings on any shoulders isn't bad for arriving at some sort of serviceability equation. However, if the maintenance to be done depended on these raters, problems would arise. For example, just taking the shoulders on contracts before 1966 (assuming at least a 4 year life), there are a total of 62. Of these, all raters agreed no work was necessary (PSI$\geq$2.5) on 29 or 47%, and all agreed work was necessary on 9 or 14%. However, on 24, or 39% of the shoulders, opinion was divided as ratings were on either side of 2.5. Also, on 12 shoulders, or 19%, the range of ratings extended across the entire 2 to 3 PSR range.

All of the above indicates that depending on PSR for determining which shoulders to repair would lend to a wide variation in maintenance limits.

The argument here might be that "we train Regional personnel to do the rating." But the more training necessary, the more defects that must be explained, and the more precautions listed, the closer you come to establishing a quantitative PSI system.

2.) Good idea, but this extra work should have been done before all the recommendations were written.

I would conclude from the data that an asphalt concrete wearing course requirements would save a tremendous amount of maintenance money and should be considered by the Department.

RECEIVED

DEC 28 1971

N.Y.S. D. of T.
ENGR. RES. & DEV.

MEMORANDUM
DEPARTMENT OF TRANSPORTATION

DATE February 3, 1971

SUBJECT SHOULDER EVALUATION REPORT

FROM George W. McAlpin, Technical Services Sub., Rm. 213, Bldg. 7
By: Lyndon H. Moore LHM

TO Malcolm D. Graham, Facilities Design Sub., Rm. 404, Bldg. 5

cc: B. A. Lefeve, Chief Engineer, Rm. 401, Bldg. 5
George Briggs, Hwy. Maintenance Sub., Rm. 423, Bldg. 5

In accordance with your request of March 4, 1970, the Bureau of Soil Mechanics has conducted a shoulder evaluation. The report transmitted herewith contains the results of this evaluation.

LHM:WPM:EJL:JAR
Enclosure

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
SOIL MECHANICS BUREAU

THE EVALUATION OF SHOULDERS IN FOUR COUNTIES

By

W. P. Moody
Associate Soils Engineer

and

E. J. Lange
Senior Soils Engineer

January 1971

ABSTRACT

A survey was made of 351 miles of shoulders in four counties of New York State using the Present Serviceability Method.

Shoulders are similar to pavements in structure, composed of subbase, base and wearing courses.

Both Item 59W and asphalt concrete used as base courses perform adequately. However, the design thickness of 59W can be reduced to 3 inches.

The design of the wearing course for an Item 59W base is of prime importance and strongly influences the maintenance cost and performance of the shoulder. Either a double surface treatment or 1 inch of Item 51M (top) is considered adequate when designed for the proper conditions.

All indications are that Item 51M (top) used as a wearing course will perform best with the least amount of maintenance.

TABLE OF CONTENTS

	PAGE
INTRODUCTION	1
SCOPE OF EVALUATION	2
RESULTS	3
OBSERVATIONS	5
CONCLUSIONS	7
RECOMMENDATIONS	10
APPENDIX	13

THE EVALUATION OF SHOULDERS IN FOUR COUNTIES

INTRODUCTION

What is the purpose of a shoulder? It is an area beyond the pavement proper where a motorist can seek haven when in distress. It will carry occasional traffic and is needed throughout the year. The surface of a shoulder should be smooth enough to allow a motorist to confidently use it at the posted speed limit.

Through the years, Engineers have tried to design adequate and economical shoulders. As highway speeds have increased, the concept of the term "adequate" has also changed. The economical shoulders of the past are not really "adequate" for today's conditions.

This evaluation study was undertaken to determine the adequacy of present shoulder designs. It was authorized by Mr. M. D. Graham, Deputy Chief Engineer on March 4, 1970.

Shoulder designs, like that of pavements, are composed of a wearing course, base course and one or more subbase courses. Shoulder designs in New York State utilize combinations of the following items:

Wearing Course

Single Surface Treatment

Double Surface Treatment

1 inch of Item 51M - Asphalt Concrete (top)

Base Course

Item 59W - Bituminous Stabilized Course

Item 45SP(SN) - Base Course, Asphalt Concrete

Item 51M - Asphalt Concrete (binder)

Subbase Course

Item 3 - Subbase Course, Granular Material

Item 4 - Subbase Course, Select Granular Material

SCOPE OF EVALUATION

It was decided to evaluate only those shoulders let to contract since 1960 in the following four counties: Oswego, Albany, Westchester, and Broome (Figure 1).

The evaluation was broken into three phases: First, the shoulders were to be cored with expectations of obtaining samples of the shoulder materials. Second, a data summary sheet was distributed to the appropriate Regions requesting design, construction and maintenance information. These data summary sheets, as returned by the Region, are included in the Appendix as Figures A, B, C and D. Third, the shoulders were evaluated; the evaluation is primarily a rating of the shoulder wearing course.

A modification of the procedure described in the Asphalt Institute's Manual Series No. 17 for determining the Present Serviceability Rating (PSR) was used to rate the shoulders. Only one shoulder was rated for each roadway. The cars were driven on the shoulders occasionally to give the raters a feeling for their roughness. The Rating Rules are shown in Figure 2 and a typical completed rating form (TEM 591) is shown in Figure 3.

RESULTS

Phase one, which involved sampling of the shoulder material by coring, was not successful. Most cores could not be retrieved because of equipment limitations. This portion of the study proved to be of little or no value and was consequently discontinued.

Phase two of the study, the data summary sheets, supplied the following information: the typical section design, items of construction and the unit cost of the items. It also contained all available information concerning maintenance experience on the shoulders for each project. Estimated maintenance cost was only available from Oswego county.

Most of the projects have Item 59W as a base material. However, several have Item 45SP(SN), an asphalt concrete. The wearing course varies, consisting of a single or double surface

treatment or an asphalt concrete. The Present Serviceability Ratings obtained during phase three are tabulated on the data summary sheets. They are also plotted versus the year of letting, as shown in Figures E, F, G, and H (Appendix). On Figure J, the average PSR for each county is plotted versus the year the contract was accepted. This data represents 351 miles of shoulder evaluation, one side, distributed as follows: Oswego - 115 miles, Albany - 64 miles, Broome - 116 miles, and Westchester - 56 miles.

The results of the PSR generally meet the requirements of acceptability as presented in the Asphalt Institute's Manual Series No. 17.

An analysis of the PSR results for Item 59W base and surface treatments indicates that maintenance engineers unknowingly consider a rating of 2.5 the minimum desirable. It is at that rating, as shown on Figure J, that maintenance work is applied to maintain a shoulder at this level of serviceability.

Figure J also indicates that the decline of serviceability is at the rate of 0.4 per year.

Included in the survey were 8 shoulders in Albany, Westchester and Broome Counties constructed of 1 inch of Item 51 over 3 or 4 inches of Item 59W base. One of these shoulders was let in

1962, one in 1964, three in 1966 and three in 1967. The average of the PSR's of these shoulders is 4.2, and the apparent rate of decline in serviceability is approximately 0.1 per year.

OBSERVATIONS

1. An important observation concerned the strength and stability of the shoulder section. Not a single incidence of rutting or similar instability was observed that could be attributed to either weakness of the shoulder base material or inadequate subbase support. However, it should be noted that this survey was conducted during the summer months. Furthermore, no apparent difference was observed in the performance of 3-inch thick Item 59W base shoulders as compared to 4-inch thick Item 59W base shoulders.

2. It was observed by members of the rating panels that two major types of shoulder failures occur. The first, "surface ravelling", is caused by traffic, snowplows and weathering. It is a function of the durability of the wearing course. The second type of failure is "drop off" at the edge of Portland cement concrete pavements. The initial drop off is caused by the densification of the shoulder section immediately adjacent to the pavement edge. This drop off condition was observed when the base course was either asphalt

concrete or Item 59W. The depth of the drop off is increased by the loss of the wearing course. This is more severe when the wearing course is a surface treatment as opposed to an asphalt concrete course. The most severe situation occurred when the loss of surface treatment(s) exposed an Item 59W base. Once exposed, ravelling of this base course rapidly increased the total drop off depth.

A noticeable joint exists between the Portland cement concrete pavement and the shoulder, regardless of the shoulder design.

3. It was observed, that where shoulders were constructed with an Item 59W base with one or more surface treatments, that the performance of the shoulder is directly related to the amount of use to which it is subjected. These shoulders have very low ratings where they are subjected to a heavy concentration of wheel loads. Even those projects with high ratings had comments on the rating forms concerning isolated ravelling and potholes at the following locations; intersections, closely spaced driveways, curves, interchanges, and other areas where there are turning movements. These shoulders performed poorly where their widths were narrow and also where they were constructed adjacent to narrow pavements. It is obvious that 2-foot shoulders, constructed with an Item 59W base and a single surface treatment, are inadequate.

4. It was observed by the rating members, that although many of the shoulders were constructed with a color contrast, that this contrast did not effectively exist at the time of rating.

CONCLUSIONS

1. No total cost (first cost plus maintenance) comparison can be made at this time, since maintenance cost records are not available.

2. No shoulder surveyed demonstrated failures that could be attributed to a deficiency of bearing strength.

3. There appears to be little difference in performance of a 3-inch thick and a 4-inch thick Item 59W shoulder (thickness does not include surface treatments).

4. Item 59W demonstrates excellent performance when used as a base material and protected with an adequate wearing course. Therefore, the design of the wearing course is of prime importance.

Single Surface Treatments

Based on the results of the survey, a single surface treatment has too short a useful life to be considered for new designs.

Double Surface Treatments

Although a full evaluation of double surface treatments is not yet possible, this survey indicates that wearing courses consisting of double surface treatments should not be designed for shoulders adjacent to Portland cement concrete pavements because of the drop off problem. A double surface treatment should not be used adjacent to narrow roadway pavements, or on narrow width shoulders because of the inordinate number of wheel load applications the shoulders receive. There are also other locations where the shoulder is subjected to wheel load repetitions that approach that of the pavement itself. At these locations, surface treatments should not be designed. Such locations are as follows: interchanges, intersections, closely spaced driveways, village and city streets, and other areas of heavy cross-shoulder turning movements such as shopping centers and other commercial and industrial installations.

Asphalt Concrete

The several shoulders surveyed having a 1-inch asphalt concrete wearing surface all demonstrated excellent performance. The 0.1 apparent rate of decline of serviceability indicates that this wearing course will perform exceptionally well with a minimum amount of maintenance,

for the duration of the design life of the adjacent pavement. Maintenance of a color contrast surface is not considered essential to the performance of the wearing course.

5. Item 59W shoulders with surface treatments require periodic patching. When the PSR reaches 2.5, major maintenance, including a single surface treatment, is required.

6. A newly constructed shoulder with an Item 59W base and a surface treatment wearing course usually does not receive a PSR exceeding approximately 4.0. Therefore, it takes approximately 4 years at a rate of decline of 0.4 per year, to reach a PSR of 2.5. Before the 2.5 is reached, varying amounts of patching are required.

This survey substantiates the policy of the Maintenance Subdivision to schedule surface treatments on a four-year cycle. However, the cycling should be based on the year of contract acceptance because of the varying construction time periods.

7. The survey indicates that for most projects, once the PSR reaches 2.5, the application of surface treatments does not raise the PSR above 3.0, as shown on Figure J.

RECOMMENDATIONS

Design

1. Item 59W should be retained as the standard base for shoulders. The standard thickness of an Item 59W base for shoulders should be 3 inches.

2. A 59W base shoulder should have a wearing course of asphalt concrete at the following locations: adjacent to Portland cement concrete pavements, adjacent to asphalt concrete pavements 22 feet or less in width, all shoulders 2 feet wide, interchanges, intersections, areas of closely spaced driveways, village and city streets, and other areas of heavy cross shoulder turning movements such as shopping centers and other commercial and industrial installations. All other locations should utilize a wearing course of either a double surface treatment or 1 inch of asphalt concrete. The final selection should be made at the time of design.

3. Where natural granular materials are not available, consideration should be given to designing the base of asphalt concrete. If the shoulder base is to be asphalt concrete, one of the following designs should be used: 2½ inches of Item 51M (1½ inches of binder, 1 inch of top) or 3 inches of Item 45SP with a single surface treatment.

4. The Item 59WWB specification should continue to be used, allowing the contractor to substitute materials in the shoulder.

5. Item 59W should not be used when the required quantity is less than approximately 600 cubic yards.

6. It may be desirable to re-evaluate the policy concerning color contrast inasmuch as the survey indicated a very short life of the effectiveness of this treatment. A field survey to determine the effective life of the color contrast course should be made. If it is found that the life expectancy is less than 4 years, it will affect the 4-year maintenance cycle.

7. All materials used in the construction of the base and wearing course of shoulders should be isolated for payment purposes so actual first cost can be determined.

8. When Item 59W is designated as a base course for an asphalt concrete pavement, the Item 59W should be mixed with Asphalt Emulsion, Item 70M, Grade A, Material Designation MS-1.

Maintenance

1. All shoulders with an Item 59W base should be maintained with an adequate wearing course to protect them from abrasion

by traffic and snowplows. When these shoulders have reached a PSR value of 2.5, they should be reconditioned by patching, as necessary, and the application of a single surface treatment.

2. Program a single surface treatment for all shoulders constructed with an Item 59W base and a surface treatment(s) 4 years from the year of contract acceptance.

3. Develop a maintenance cost accounting system which will enable an accurate determination of shoulder maintenance cost, thus enabling total cost of various shoulder designs to be computed.

Construction

1. The requirements of General Letter 68-40 dated May 29, 1968 should be continued.

General

1. The Department should adopt the Present Serviceability Rating method for evaluating shoulders.

2. Additional shoulder studies should be performed during 1971 to enlarge the knowledge concerning the performance of shoulder wearing courses.

APPENDIX

LIST OF FIGURES

1. Location Map
2. Rating Rules
3. Rating Form

A. Data Summary Sheet, Oswego County
B. Data Summary Sheet, Albany County
C. Data Summary Sheet, Westchester County
D. Data Summary Sheet, Broome County
E. P.S.R. Vs. Time, Oswego County
F. P.S.R. Vs. Time, Albany County
G. P.S.R. Vs. Time, Westchester County
H. P.S.R. Vs. Time, Broome County
J. Average County Ratings Vs. Time

NEW YORK STATE
COUNTIES

FIGURE 1

RATING RULES

When rating the shoulders, the following general rules should be observed:

1. The shoulder should be rated as to present serviceability.

2. The rater should consider only the present condition of the shoulder and should rate a shoulder "good" even though he suspects it will fail in the near future.

3. The rating should be based on the fact that the shoulder will have to serve all types of traffic under all weather conditions.

4. The design features of the section should be ignored.

5. The raters should be concerned primarily with holes, raveling, cracking, rutting, gap at pavement edge, and drop off.

6. The raters should ignore isolated poor conditions.

7. Each section or project should be rated separately and the rater should not refer to previous forms, discuss his ratings with another rater, or seek advice from others concerning condition or design of any section. All forms shall be collected by a designated person and placed in an envelope immediately after rating each project.

8. The rater should mark the scale in relation to the descriptive words - not figure a particular numerical value and attempt to scale this value.

9. When answering the question "Are shoulders of acceptable quality?" - Assume your wife is driving on the highway at the legal speed and she gets a flat tire. In your opinion, will she confidently pull onto the shoulder?

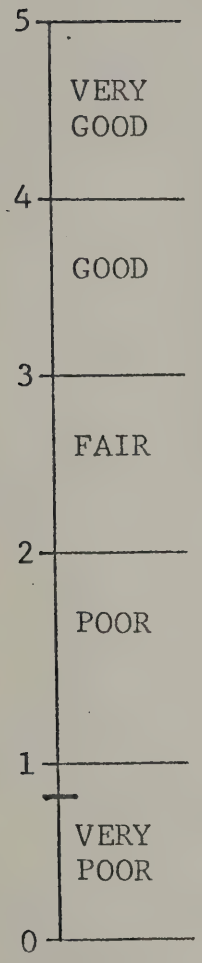
10. Only one shoulder will be evaluated for each project. Three raters per automobile should be ideal. The speed of the automobile should be approximately 30 to 40 MPH.

FIGURE 2

TEM 591 (5/70)

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
BUREAU OF SOIL MECHANICS

PRESENT SERVICEABILITY RATING (PSR) SHOULDERS



PROJECT NAME Croton River - Peckskill

CONTRACT NO. FARC 63-16

RATER T. Mannix

DATE 6/16/70

IS SHOULDER OF ACCEPTABLE QUALITY	
YES	☐
NO	☑
UNDECIDED	☐

REMARKS:

Severe Raveling of surface
Corrugated riding surface
1" Drop-off at pavement edge where patched
2" to 3" Hazardous drop-off elsewhere

FIGURE 3

		ASPHALT CONCRETE					
		BASE COURSE		BINDER AND TOP		MAINTENANCE EXPERIENCE SINCE CONSTRUCTION	
M	COST PER SQ. YD.	ITEM	COST PER TON	ITEM	COST PER TON		TOTAL MAINTENANCE EXPENDITURE
	-	EXIST. PVT	-	51	9.00	PATCHING FOR 8 YEARS. SURFACE TREATMENT 1964, 1966	$ 2,318
	-	-	-	51	9.75		
	-	45SY	8.95	51	8.95	PATCHING FOR 7 YEARS. NO SURFACE TREATMENT	2,109
	-	CONCRETE	-	51	8.27	PATCHING FOR 9 YEARS. SURFACE TREATMENT 1964, 1968	28,372
	-	45SY	8.40	51	8.60	PATCHING FOR 7 YEARS. NO SURFACE TREATMENT, HEAVILY SPRAY PATCHED	450
	-	45SY	8.75	51	9.00	PATCHING FOR 8 YEARS. SURFACE TREATMENT 1967, 1970	8,559
	-	OLD ROAD	-	51	8.85	PATCHING FOR 7 YEARS. SURFACE TREATMENT 1969	1,715
	-	45SY	8,10	51	8.25	PATCHING FOR 8 YEARS. SURFACE TREATMENT 1967, 1970	8,663
	-	45SY	8.75	51	8.75	PATCHING FOR 8 YEARS. NO SURFACE TREATMENT	1,997
	-	OLD ROAD	-	51	8.35	PATCHING FOR 5 YEARS. ABANDONED 12/26/68. SURFACE TREATMENT 1967	5,499
	-	45SM	7.50	51M	7.90	UNDER COUNTY MAINTENANCE	
	-	45SM	7.90	51M	7.90	PATCHING FOR 5 YEARS. SURFACE TREATMENT 1970	9,035
	.25	45SN	10.00	51MS	10.00	UNDER COUNTY MAINTENANCE	
	-	-	-	51MS	-	PATCHING FOR 4 YEARS. NO SURFACE TREATMENT	6,497
	.15	-	-	51MS	7.85	PATCHING FOR 3 YEARS. SURFACE TREATMENT 1970	9,625
	.15	-	-	51MS	9.26	PATCHING FOR 3 YEARS. NO SURFACE TREATMENT	388
	.18	45SN	13.00	51MS	13.00	PATCHING FOR 1 YEAR. (SMALL) NO SURFACE TREATMENT	37
	.15	-	-	51MT	9.50	PATCHING FOR 1 YEAR. (SMALL) NO SURFACE TREATMENT	10
	.15	-	-	51ACT3	10.50	PATCHING FOR 1 YEAR. (SMALL) NO SURFACE TREATMENT	21

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
BUREAU OF SOIL MECHANICS

SHOULDER EVALUATION
DATA SUMMARY SHEET
OSWEGO COUNTY
FIGURE A

PREPARED BY: Edward M. Reynolds
DRAWN BY: Norman S. Jensen
CHECKED BY: E. J. Lange

APPROVED Oct. 5 1970 REGION No. 3
Wm. P. McJunkin
DIRECTOR

COUNTY OSWEGO
DRAWING NO. SM1708A

CONTRACT NUMBER	PROJECT	AVERAGE PRESENT SERVICEABILITY RATINGS (PSR)	ROADWAY SECTION			SUBBASE			BITUMINOUS STABILIZED GRAVEL						SURFACE TREATMENT						ASPHALT CONCRETE				MAINTENANCE EXPERIENCE SINCE CONSTRUCTION	
			PAVEMENT WIDTH	SHOULDER WIDTH	SHOULDER DESIGN	ITEM	QUANTITY CU. YDS.	COST PER CU. YD.	ITEM	QUANTITY CU. YDS.	COST PER CU. YD.	ADDITIVE			SINGLE	DOUBLE	STONE				BASE COURSE		BINDER AND TOP			TOTAL MAINTENANCE EXPENDITURE
												BIT. ITEM No.	COST PER GAL.	TOTAL GALS.			ITEM	COST PER SQ. YD.	ITEM	COST PER SQ. YD.	ITEM	COST PER TON	ITEM	COST PER TON		
RC 60-49	Fulton - Three Rivers, Pt. 1	2.8	20'	4'	3" thick - 59TCM	39AGLX	5,096	1.50	59TCM	858	3.00	67DX	.20	17,833	x		-	-	-	-	Exist. pvt	-	51	9.00	Patching for 8 years. Surface treatment 1964, 1966	$ 2,318
RC 60-169	S. W. Oswego - Cayuga Co. Line, Co. Rd. 104	3.0	24'	8'	3" thick - 59TCM	39AG	112,000	1.62	59TCM	7,400	4.50	67DX	.20	125,000	x		-	-	-	-	-	-	51	9.75		
RC 61-6	Parish - Camden	1.9	22'	6'	3" thick - 59TCM	39AG	9,408	1.70	59TCM	845	4.00	70KM	.17	18,313	x		-	-	-	-	45SY	8.95	51	8.95	Patching for 7 years. No surface treatment	2,109
RC 61-48	Mexico - Selkirk State Park	2.5	20'	4'	3" thick - 59TCM	39A	23,644	1.65	59TCM	5,693	3.75	70KM	.18	95,469	x		-	-	-	-	Concrete	-	51	8.27	Patching for 9 years. Surface treatment 1964, 1968	28,372
FARC 61-108	Maple View - Checkered House	2.3	24'	8'	3" thick - 59TCY	39A	5,973	2.00	59TCY	724	4.00	70KM	.17	11,023	x		-	-	-	-	45SY	8.40	51	8.60	Patching for 7 years. No surface treatment, heavily spray patched	450
FARC 61-142	Sterling - Oswego, Pt. 2	2.8	22'	7'	3" thick - 59M	39A	13,992	1.40	59M	1,818	4.00	70KM	.18	33,562	x		-	-	-	-	45SY	8.75	51	9.00	Patching for 8 years. Surface treatment 1967, 1970	8,559
RC 62-18	Granby Corners (Hannansville Sect.)	3.5	20'	6'	4" thick - 59M	39A	2,880	2.75	59M	1,456	4.40	70KM	.17	26,907	x		-	-	-	-	Old Road	-	51	8.85	Patching for 7 years. Surface treatment 1969	1,715
RC 62-90	Meridan - Bowers Cors.	3.2	18'	2'	4" thick - 59M	39ALX	7,631	1.95	59M	1,827	4.50	70KM	.15	31,655	x		-	-	-	-	45SY	8.10	51	8.25	Patching for 8 years. Surface treatment 1967, 1970	8,663
RC 62-91	Hastings - Parish	1.1	18'	2'	4" thick - 59M	39ALX	1,351	2.75	59M	503	4.50	70KM	.18	9,997	x		-	-	-	-	45SY	8.75	51	8.75	Patching for 8 years. No surface treatment	1,997
RC 62-92	Fulton - Hannibal, Pts. 1 & 2	1.9	18'	2'	4" thick - 59M	39ALX	5,812	2.10	59M	1,514	4.75	70KM	.15	27,000	x		-	-	-	-	Old Road	-	51	8.35	Patching for 5 years. Abandoned 12/26/68. Surface treatment 1967	5,499
FASS 62-11	Sand Ridge - Stump Valley Rd.	3.8	20'	2'	4" thick - 59MW	4	6,176	2.80	59MW	1,220	5.00	70KM	.20	21,875	x		-	-	-	-	45SM	7.50	51M	7.90	Under County Maintenance	
FARC 62-35	Volney - Roosevelt Cors. - Central Sq.	1.9	20'	2'	4" thick - 59MW	4	28,135	3.00	59MW	2,643	5.00	70KM	.20	47,250	x		-	-	-	-	45SM	7.90	51M	7.90	Patching for 5 years. Surface treatment 1970	9,035
FASS 65-22	Lehigh Road - Centerville Road	4.0	22'	9'	4" thick - 59MA	4	3,424	4.50	59MA	2,324	7.00	69MA	.20	43,771	x		-	-	260	.25	45SN	10.00	51MS	10.00	Under County Maintenance	
RC 65-40	Oswego - Mexico, Pts. 1 & 2	1.8	20'	6'	3" thick - 59MA	-	-	-	59MA	6,926	-	69MA	-	120,327	x		-	-	260	-	-	-	51MS	-	Patching for 4 years. No surface treatment	6,497
RC 65-140	Central Square - Constantia, Pts. 1 & 2	3.3	20'	5'	4" thick - 59MA	4	16,088	2.90	59MA	9,280	5.00	69MA	.18	129,313	x		-	-	260	.15	-	-	51MS	7.85	Patching for 3 years. Surface treatment 1970	9,625
RC 66-91	Mexico - Union Square, Pts. 1 & 2	2.6	20'	6'	4" thick - 59MA	4	6,432	4.00	59MA	2,913	5.00	69MA	.20	50,213	x		-	-	260	.15	-	-	51MS	9.26	Patching for 3 years. No surface treatment	388
RC 66-119	Fulton - Hannibal	3.8	24'	10'	4" thick - 59MA	4	21,130	4.10	59MA	8,383	4.75	69MA	.17	167,000	x		-	-	260	.18	45SN	13.00	51MS	13.00	Patching for 1 year. (small) No surface treatment	37
RC 67-72	Southwest Oswego - Fruit Valley	4.1	20'	6'	4" thick - 59MB	4	8,932	4.00	59MB	3,505	5.00	70MS	.18	48,904		x	55S	.15	605	.15	-	-	51MT	9.50	Patching for 1 year. (small) No surface treatment	10
RC 68-51	Fulton - Scriba, Pt. 1	4.4	20'	4'	4" thick - 59MB	4	22,892	3.75	59MB	3,934	5.50	69MA	.18	51,103		x	55S	.15	605	.15	-	-	51ACT3	10.50	Patching for 1 year. (small) No surface treatment	21

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
BUREAU OF SOIL MECHANICS

SHOULDER EVALUATION
DATA SUMMARY SHEET
OSWEGO COUNTY
FIGURE A

PREPARED BY: Edward P. Reynolds
DRAWN BY: Norman A. Jansen
CHECKED BY: P.J. Lafy

APPROVED Oct 5 1970 REGION No. 3
DIRECTOR
COUNTY Oswego
DRAWING NO. SM1708A

	ASPHALT CONCRETE				
	BASE COURSE		BINDER AND TOP		MAINTENANCE EXPERIENCE SINCE CONSTRUCTION
COST PER SQ. YD.	ITEM	COST PER TON	ITEM	COST PER TON	
-	45SY	7.00	51M	8.00	1967 - Portions without curb - given single surface treatment with Item 67D at $.35 gal./s.y. and No. 1A stone.
-	45SY	7.00	51M	8.00	1966 - Given single surface treatment with Item 67D at $.35 gal./s.y. and No. 1A stone.
-	-	-	51M	-	Portions with curb not touched; portions without curb patched as needed.
-	45SY	6.75	51M	6.75	Repaired as needed with available material.
-	45SY	6.65	51M	7.00	Repaired as needed with available material.
-	45SY	7.00	51M	7.50	Portion east of Normanskill maintained by City of Albany; portion west of Normanskill repaired as needed with available material.
-	45SY	7.00	51M	8.00	Maintained by City of Albany and County of Albany.
-	45SX	9.00	51MA	10.50	Repaired as needed with available material.
-	-	-	51M	9.00	Repaired as needed with available material.
-	45SX	8.00	51M	8.15	Repaired as needed with available material.
-	45SM	8.00	51M	8.50	Maintained by County of Albany.
-	45SM	7.50	51M	7.50	1970 - Will be given single surface treatment with Item 67D at $.35 gal./s.y. and No. 1 stone this season.
-	45SN	9.50	51M	9.50	1969 - Edge of shoulder next to pavement patched with plant mix.
.15	45SN	8.00	51M	9.00	Repaired as needed with available material.
.18	45SN	7.00	51M	7.75	Repaired as needed with available material.
.30	45SN	9.50	51M	9.50	R.O.B. gravel fill at two locations on east side where embankment failed; otherwise, shoulders have been maintenance free.
.24	45SN	11.00	51M	12.00	Maintenance free, still in excellent condition.
-	45SN	10.00	51M	10.00	Maintained by County of Albany
.40	45SN	20.00	51M	12.00	Maintenance free, still in excellent condition.
.30	45SN	10.00	51M	10.00	Maintenance free, still in excellent condition.
.35	45SP	13.00	51M	13.00	Maintenance free, still in excellent condition.

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
BUREAU OF SOIL MECHANICS

SHOULDER EVALUATION
DATA SUMMARY SHEET
ALBANY COUNTY
FIGURE B

PREPARED BY: Edwin M. Reynolds
DRAWN BY: Norman W. Jensen
CHECKED BY: E. J. Lange

APPROVED Oct. 5 1970
Wm. P. Hofmann
DIRECTOR

REGION No. 1
COUNTY Albany
DRAWING NO. SM 17080

CONTRACT NUMBER	PROJECT	AVERAGE PRESENT SERVICEABILITY RATINGS (PSR)	ROADWAY SECTION			SUBBASE			BITUMINOUS STABILIZED GRAVEL						SURFACE TREATMENT						ASPHALT CONCRETE				MAINTENANCE EXPERIENCE SINCE CONSTRUCTION
			PAVEMENT WIDTH	SHOULDER WIDTH	SHOULDER DESIGN	ITEM	QUANTITY CU. YDS.	COST PER CU. YD.	ITEM	QUANTITY CU. YDS.	COST PER CU. YD.	ADDITIVE			SINGLE	DOUBLE	STONE				BASE COURSE		BINDER AND TOP		
												BIT. ITEM No.	COST PER GAL.	TOTAL GALS.			ITEM	COST PER SQ. YD.	ITEM	COST PER SQ. YD.	ITEM	COST PER TON	ITEM	COST PER TON	
FAC 61-6	Crosstown - Washington Ave. - Krumkill Rd.	3.8	24'	8'	3" thick - 59TCM	39B	51,780	2.00	59TCM	-	-	-	-	-	x		-	-	-	-	45SY	7.00	51M	8.00	1967 - Portions without curb - given single surface treatment with Item 670 at $.35 gal./s.y. and No. 1A stone.
FASH 61-24	Delmar By-Pass	3.4	24'	8'	4" thick - 59W	39A	56,200	2.70	59W	-	-	-	-	-	x		-	-	-	-	45SY	7.00	51M	8.00	1966 - Given single surface treatment with Item 670 at $.35 gal./s.y. and No. 1A stone.
FIC 62-3	Int. Conn 5I0, 9M - Green St.	4.0 3.6	24'	8'	5" thick - 4" 59W, 1" 51M	39AM	40,310	-	59W	-	-	-	-	-	x		-	-	-	-	-	-	51M	-	Portions with curb not touched; portions without curb patched as needed.
RC 62-86	Indian Fields - Dormansville	1.3	18'	3'	4" thick - 59W	39AB	5,250	2.40	59W	632	5.25	70M	.15	12,500	x		-	-	-	-	45SY	6.75	51M	6.75	Repaired as needed with available material.
RC 62-200	Westerlo - Dormansville	1.4	16'	2'	4" thick - 59W	39AB	930	3.00	59W	1,474	6.00	70M	.15	27,663	x		-	-	-	-	45SY	6.65	51M	7.00	Repaired as needed with available material.
FARC 62-208	Slingerlands - Albany	1.4	22'	5'	4" thick - 59WW	39AX	3,800	3.00	59WW	302	7.00	70M	.20	5,504	x		-	-	-	-	45SY	7.00	51M	7.50	Portion east of Normanskill maintained by City of Albany; portion west of Normanskill repaired as needed with available material.
FISH 63-1	Everett Road Ext.	3.5	36'	8'	4" thick - 59W	39A	11,000	3.00	59W	729	8.00	70M	.16	16,933	x		-	-	-	-	45SY	7.00	51M	8.00	Maintained by City of Albany and County of Albany.
FARC 63-22	Wolf Hill - Berne	2.4	22'	5'	4" thick - 59WW	4	3,500	3.75	59WW	95	6.50	70M	.20	1,519	x		-	-	-	-	45SX	9.00	51MA	10.50	Repaired as needed with available material.
RC 63-82	Voorheesville - New Salem	2.1	18'	2'	4" thick - 59WX	-	-	-	59WX	477	5.50	70M	.16	9,932	x		-	-	-	-	-	-	51M	9.00	Repaired as needed with available material.
RC 63-91	Coeymans - Indian Fields	1.2	20'	2'	4" thick - 59WX	-	-	-	59WX	2,066	5.50	70M	.16	36,138	x		-	-	-	-	45SX	8.00	51M	8.15	Repaired as needed with available material.
FASS 64-7	Karner Road - Vly Road	2.5	24'	8'	4" thick - 59WY	4X	21,350	4.00	59WY	4,060	8.00	70M	.15	115,232	x		-	-	-	-	45SM	8.00	51M	8.50	Maintained by County of Albany.
FARC 64-10	Osborne Cors. - Schenectady Co. Line	2.7	22'	8'	4" thick - 59WW	-	-	-	59WW	1,587	5.50	70M(A)	.15	32,534	x		-	-	-	-	45SM	7.50	51M	7.50	1970 - Will be given single surface treatment with Item 670 at $.35 gal./s.y. and No. 1 stone this season.
FASH 64-13	Slingerlands By-Pass	3.0	24'	8'	4" thick - 59WWX	4X	23,100	4.00	59WWX	3,640	11.00	67DX	.15	76,137	x		-	-	-	-	45SN	9.50	51M	9.50	1969 - Edge of shoulder next to pavement patched with plant mix.
FIC 65-10	I-504, Fuller Road - Everett Road.	3.9	24'	8'	4" thick - 59WWAS	4S	51,460	4.00	59WWAS	6,070	8.00	67DX(A)	.14	24,650		x	55S	.32	60S	.15	45SN	8.00	51M	9.00	Repaired as needed with available material.
FARC 65-19	Loudon - Crescent	3.5	24'	8'	4" thick - 59WWA	4	16,850	2.90	59WWA	2,750	7.00	67DX(A)	.16	12,839	x		-	-	26O	.18	45SN	7.00	51M	7.75	Repaired as needed with available material.
RC 65-59	Selkirk - Coeymans	3.2	20'	4'	4" thick - 59WWA	-	-	-	59WWA	905	6.50	67DX(A)	.20	16,773	x		-	-	26O	.30	45SN	9.50	51M	9.50	R.O.B. gravel fill at two locations on east side where embankment failed; otherwise, shoulders have been maintenance free.
FIC 66-2	I-502, I-504, Fuller Road - Thruway	3.3	24'	10'	4" thick - 59WWAS	4S	9,750	5.00	59WWAB	1,196	10.00	67DX(A)	.20	26,823		x	55S	.30	60S	.24	45SN	11.00	51M	12.00	Maintenance free, still in excellent condition.
FASS 66-10	Long Lane Co. Rd.	4.2	22'	7'	4" thick - 3" 59WW, 1" 51MS	4	6,670	4.00	59WW	1,224	10.00	67DX	.16	23,500	x		55B	.40	-	-	45SN	10.00	51M	10.00	Maintained by County of Albany
RC 66-29	Glenmont - Feura Bush	3.6	20'	3'	4" thick - 59WWAX	4X	1,800	4.50	59WWAX	940	7.00	67DX	.15	16,730	x		-	-	26O	.40	45SN	20.00	51M	12.00	Maintenance free, still in excellent condition.
RC 66-138	Glenmont - Feura Bush (Relocated Elm Ave.)	4.6	22'	9'	4" thick - 3" 59WW, 1" 51MS	4X	12,550	4.50	59WW	2,409	8.00	70M(A)	.20	46,669	x		70B	.20	60C	.30	45SN	10.00	51M	10.00	Maintenance free, still in excellent condition.
SH 67-15	Washington Ave. Ext.	4.1	24'	10'	4" thick - 3" 45SP, 1" 51MA	4	21,400	6.00	-	-	-	-	-	-	x		-	-	60S	.35	45SP	13.00	51M	13.00	Maintenance free, still in excellent condition.

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
BUREAU OF SOIL MECHANICS

SHOULDER EVALUATION
DATA SUMMARY SHEET
ALBANY COUNTY
FIGURE B

PREPARED BY: Edward J. Brumbly
DRAWN BY: Norman W. Jensen
CHECKED BY: E J Lutz

APPROVED Oct. 5 1970
Wm. P. Hollman
DIRECTION

REGION No. 1
COUNTY Albany
DRAWING NO. SM 17088

	ASPHALT CONCRETE				MAINTENANCE EXPERIENCE SINCE CONSTRUCTION
	BASE COURSE		BINDER AND TOP		
COST PER SQ. YD.	ITEM	COST PER TON	ITEM	COST PER TON	
-	45S	10.00	51M	12.00	Completed, 1963. Shoulders began disintegrating after several months. Resurfaces on several occasions with plant mix and gravel.
-	45SY	11.75	51M	12.50	Shoulders oiled 1967 at $.10/sq. yd.
-	45S	10.00	51M	12.00	Completed, 1965. Longitudinal settling occurred, brought back to grade with plant mix. Shoulders breaking up during past year.
-	45SN	14.00	51MX	25.00	.51M placed in lieu of 59N.
-	45SN	14.00	51M	14.00	Completed, 1965. Longitudinal settling occurred, brought back to grade with plant mix. Shoulders breaking up during past year.
-	45SN	14.50	51M	14.50	Shoulders reconstructed during succeeding contract. See FARC 61-15.
-	45SN	13.00	51M	12.80	Half of shoulders rebuilt under RC 66-120. Remaining shoulders must be replaced. Est. cost $1.25/s.y. plus labor.
.50	45SN	14.00	51MX	18.00	
-	45SN	11.00	51M	12.00	Longitudinal settling and frost heaving. Shoulders began deteriorating about one year after completion.
.60	45SN	14.00	51M	14.00	
.20	45SN	10.00	51M	12.00	Placed 1968. No maintenance to date.
-	45SN	15.00	51M	15.00	
.30	45SN	13.00	51M	14.00	Completed, 1965. Longitudinal settling. Breaking up during last year.
.30	45SN	12.50	51M	12.75	Completed, 1966. Minimum amount of deterioration along longitudinal joint between pavement and shoulder.
.60	45X	15.00	51MS	16.00	
.50	45SP	16.00	51M	16.00	Placed 1969-70. Contract not open to public.
.35	45SN	14.00	51MDX	19.00	Placed 1967-68. Maintenance at intersections of Route 128 and 120. 1969 - 5 tons at $10. - $50. + labor; 1970 - 2 tons at $10.95 - $21.90 + labor.
.50	45SN	13.00	51M	13.15	Placed 1968. No maintenance costs to date. Max. amount of bitumen allowable used.
.50	-	-	51MB	18.25	Completed, 1968. No maintenance problems to date.

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
BUREAU OF SOIL MECHANICS

SHOULDER EVALUATION
DATA SUMMARY SHEET
WESTCHESTER COUNTY
FIGURE C

PREPARED BY: Edward McReynolds
DRAWN BY: Norman A. Jensen
CHECKED BY: L. J. Langer

APPROVED Oct. 5 1970
Wm. P. Hofmann
DIRECTOR

REGION No. 8
COUNTY Westchester
DRAWING NO. SM 1708C

CONTRACT NUMBER	PROJECT	AVERAGE PRESENT SERVICEABILITY RATINGS (PSR)	ROADWAY SECTION			SUBBASE			BITUMINOUS STABILIZED GRAVEL						SURFACE TREATMENT						ASPHALT CONCRETE				MAINTENANCE EXPERIENCE SINCE CONSTRUCTION
			PAVEMENT WIDTH	SHOULDER WIDTH	SHOULDER DESIGN	ITEM	QUANTITY CU. YDS.	COST PER CU. YD.	ITEM	QUANTITY CU. YDS.	COST PER CU. YD.	ADDITIVE			SINGLE	DOUBLE	STONE				BASE COURSE		BINDER AND TOP		
												BIT. ITEM No.	COST PER GAL.	TOTAL GALS.			ITEM	COST PER SQ. YD.	ITEM	COST PER SQ. YD.	ITEM	COST PER TON	ITEM	COST PER TON	
RC 60-168	Bedford - Goldens Bridge	0.8	24'	8'	3" thick - 59TCM	39AP	75,204	2.70	59TCM	5,462	5.00	70M	.15	103,559	x		-	-	-	-	45S	10.00	51M	12.00	Completed, 1963. Shoulders began disintegrating after several months. Resurfaces on several occasions with plant mix and gravel.
FARC 61-3	Ossining - Kitchawan	2.9	24'	8'	3" thick - 59TCM	39AP	32,267	2.55	59TCM	1,521	7.00	67DX	.18	28,475	x		-	-	-	-	45SY	11.75	51M	12.50	Shoulders oiled 1967 at $.10/sq. yd.
FARC 61-15	Croton River - Peekskill	2.3	24'	8'	3" thick - 59TA	39AP	90,168	3.00	59TCM	3,628	6.00	67DX	.17	77,089	x		-	-	-	-	45S	10.00	51M	12.00	Completed, 1965. Longitudinal settling occurred, brought back to grade with plant mix. Shoulders breaking up during past year.
FASS 63-11	Mamaroneck Avenue	3.7	25'	10'	4" thick - 59MW	4	11,056	5.50	59MWX	357	11.00	70MS	.20	38,024	x		-	-	-	-	45SN	14.00	51MX	25.00	.5IM placed in lieu of 59M.
FARC 63-16	Croton River - Peekskill	1.4	24'	8'	4" thick - 59MW	39AP	37,217	4.00	59MWX	6,186	9.00	70M	.16	123,783	x		-	-	-	-	45SN	14.00	51M	14.00	Completed, 1965. Longitudinal settling occurred, brought back to grade with plant mix. Shoulders breaking up during past year.
FARC 63-18	Ossining - Croton River	3.1	24'	8'	4" thick - 59MW	39APX	9,806	5.85	59MW	2,588	10.00	70MM	.16	64,688	x		-	-	-	-	45SN	14.50	51M	14.50	Shoulders reconstructed during succeeding contract. See FARC 61-15.
FARC 63-110	White Plains - Armonk	1.9	40'	3½' to 8'	4" thick - 59MW	4	4,662	6.00	59MW	894	11.00	70MS	.20	20,966	x		-	-	-	-	45SN	13.00	51M	12.80	Half of shoulders rebuilt under RC 66-120. Remaining shoulders must be replaced. Est. cost $1.25/s.y. plus labor.
CCP 64-1	Cross County Parkway - No. Columbus Ave. - Grutman Ave.	4.0	24'	10'	4" thick - 3" 59MS, 1" 5IMS	4	4,123	5.50	59MS	1,069	20.00	70MS	.16	26,809	x		-	-	60C	.50	45SN	14.00	51MX	18.00	
FISH 64-8	Haroscrabble Road - Brewster	2.5	24'	8'	4" thick - 59MS	4	15,162	4.50	59MS	2,235	8.50	70MS	.13	58,130	x		-	-	-	-	45SN	11.00	51M	12.00	Longitudinal settling and frost heaving. Shoulders began deteriorating about one year after completion.
TSP 65-2	Campfire Road - Kitchawan	3.7	24'	8'	4" thick - 59MS	4	39,730	5.50	59MS	985	16.00	70MS	.15	27,797	x		-	-	60C	.60	45SN	14.00	51M	14.00	
FISH 65-17	I-502, Cross Westchester Expressway - Armonk	3.4	24'	8'	4" thick - 59MS	4X	113,699	5.00	59MABA	20,280	8.00	70MS	.13	546,614	x		-	-	26O	.20	45SN	10.00	51M	12.00	Placed 1968. No maintenance to date.
FAC 65-20	New Rochelle Arterial	4.0	25'	8'	5" thick - 4" 45SN, 1" 51M	4	6,120	6.75	-	-	-	-	-	-	-		-	-	-	-	45SN	15.00	51M	15.00	
RC 65-25	Peekskill - Putnum Co. Line	2.0	20'	5'	4" thick - 59MS	4	4,490	10.00	59MS	1,098	15.00	70MS	.16	27,851	x		-	-	26O	.30	45SN	13.00	51M	14.00	Completed, 1965. Longitudinal settling. Breaking up during last year.
RC 65-31	Pines Bridge - Halls Corns.	3.3	24'	8'	4" thick - 59MS	4	12,936	5.25	59MS	5,320	11.00	70MS	.16	7,834	x		-	-	26O	.30	45SN	12.50	51M	12.75	Completed, 1966. Minimum amount of deterioration along longitudinal joint between pavement and shoulder.
CCP 66-1	Hudson Parkway - Cross Co. Parkway (Hartsburg Conn. - Webster Av.)	4.1	36'	10'	4" thick - 3" 59MS, 1" 5IMS	4	16,920	6.00	59MS	2,036	20.00	70MS	.20	40,605	x		-	-	60C	.60	45X	15.00	51MS	16.00	
SH 66-15	North Tarrytown - Pleasantville	4.3	24'	10'	4" thick - 59MS	4	14,123	7.50	59MWB	2,139	20.00	70MS	.20	48,853	x		-	-	26O	.50	45SP	16.00	51M	16.00	Placed 1969-70. Contract not open to public.
RC 66-120	White Plains - Armonk, Pt. 2	3.0	25'	10'	4" thick - 59MS	4	14,133	7.30	59MWB	2,317	12.00	70MS	.15	72,719	x		-	-	26O	.35	45SN	14.00	51MDX	19.00	Placed 1967-68. Maintenance at intersections of Route 128 and 120. 1969 - 5 tons at $10. - $50. + labor; 1970 - 2 tons at $10.95 - $21.90 + labor.
FARC 66-151	McKeels Corns. - Briarcliff - Echo Lake	2.9	24'	10'	4" thick - 59MS	4	15,173	6.50	59MS	3,804	20.00	70MS	.20	18,346	x		-	-	60C	.50	45SN	13.00	51M	13.15	Placed 1968. No maintenance costs to date. Max. amount of bitumen allowable used.
RC 68-75	Crafts Corns. - Vista	3.5	20'	2'	4" thick - 5IMB	4	1,300	12.00	-	-	-	-	-	-	x		-	-	60S	.50	-	-	51MB	18.25	Completed, 1968. No maintenance problems to date.

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
BUREAU OF SOIL MECHANICS

SHOULDER EVALUATION
DATA SUMMARY SHEET
WESTCHESTER COUNTY
FIGURE C

PREPARED BY: Edward McGrondle
DRAWN BY: Norman O. Jensen
CHECKED BY: C.J. Lange

APPROVED Oct. 5 1970
Wm. P. Hillman
DIRECTOR

REGION No. 8
COUNTY Westchester
DRAWING NO. SM 17066

		ASPHALT CONCRETE				MAINTENANCE EXPERIENCE SINCE CONSTRUCTION
		BASE COURSE		BINDER AND TOP		
M	COST PER SQ. YD.	ITEM	COST PER TON	ITEM	COST PER TON	
	10.00	45SY	10.00	51M	10.00	RESURFACE 1970
	-	45SY	8.00	51M	9.00	PATCHED 1969
	-	45SP	9.00	51M	9.00	RESURFACE 1970
	-	45SY	9.00	51M	10.00	NONE
	2.00	45SY	10.00	51M	10.00	RESURFACE 1970
	-	45SY	8.80	51M	9.00	RESURFACE 1970
	-	45SY	9.00	51M	11.00	RESURFACE 1970
	-	-	-	51M	11.00	NONE
	-	45SY	9.00	51M	9.50	MEDIAN SHOULDER REBUILT 1969
	-	45SX	9.00	51M	10.00	RESURFACE 1970
	-	-	-	51	11.00	RESURFACE 1967
	-	45SM	11.00	51M	11.00	NONE
	-	45SN	10.00	51M	10.25	PATCHED 1967, 1968, 1969
	.25	45SN	10.00	51M	11.00	PATCHED 1969, 1970
	-	45SN	11.30	51M	11.65	NONE
	-	-	-	51M	9.40	NONE
	-	45SN	10.50	51M	11.50	NONE
	-	45SN	10.50	51M	11.00	NONE
	-	45SP	12.50	51	12.25	NONE
	.80	45SP	12.00	51	11.50	NONE
	-	45SP	12.00	51M	12.00	NONE
	-	45SP	13.00	51X9	15.00	NONE
	-	45SP	17.00	51X9	20.00	NONE
						1969 - 1970 29 SHOULDER MILES 1-81, $203. PER MILE FOR MATERIALS AND SALARY 76 SHOULDER MILES OTHER ROADS, $238. PER MILE FOR MATERIALS AND SALARY ($.19 PER SQ. YD. SURFACE TREATMENT - MATERIALS AND SALARY)

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
BUREAU OF SOIL MECHANICS

SHOULDER EVALUATION
DATA SUMMARY SHEET
BROOME COUNTY
FIGURE D

PREPARED BY: Edward M. [illegible]
DRAWN BY: Norman W. Jensen
CHECKED BY: E. J. Lange

APPROVED Oct. 5 1970
Wm. P. [illegible]
DIRECTOR

REGION No. 9
COUNTY BROOME
DRAWING NO. SM 17080

CONTRACT NUMBER	PROJECT	AVERAGE PRESENT SERVICEABILITY RATINGS (PSR)	ROADWAY SECTION			SUBBASE			BITUMINOUS STABILIZED GRAVEL						SURFACE TREATMENT						ASPHALT CONCRETE				MAINTENANCE EXPERIENCE SINCE CONSTRUCTION
												ADDITIVE					STONE				BASE COURSE		BINDER AND TOP		
			PAVEMENT WIDTH	SHOULDER WIDTH	SHOULDER DESIGN	ITEM	QUANTITY CU. YDS.	COST PER CU. YD.	ITEM	QUANTITY CU. YDS.	COST PER CU. YD.	BIT. ITEM No.	COST PER GAL.	TOTAL GALS.	SINGLE	DOUBLE	ITEM	COST PER SQ. YD.	ITEM	COST PER SQ. YD.	ITEM	COST PER TON	ITEM	COST PER TON	
FISH 60-3P	I-505, Penn. State Line - 5 Mile Point	3.0	24'	8'	3" thick - 56 (bit. mac. pen)	39A	97,055	1.90	56	9,103	10.00	64P	.15	257,880	x		45	11.00	56	10.00	45SY	10.00	51M	10.00	Resurface 1970
FARC 60-10	Chenango - Tow Path (Port Crane - No. Fenton)	2.6	24'	8'	3" thick - 59TCM	39A	71,463	1.25	59TCM	3,323	4.00	70MSS-1	.18	64,024		x	59C	3.50	-	-	45SY	8.00	51M	9.00	Patched 1969
FISH 60-4	I-505, Sunset Drive - Route 17	2.7	24'	8'	3" thick - 59TCMX	39A	20,550	4.30	59TCMX	800	3.10	70MSS-1	.18	10,364	x		-	-	-	-	45SP	9.00	51M	9.00	Resurface 1970
FARC 60-17	Hooper - Johnson City (Geo. F. Highway) (Shovel Mix)	3.3	36'	8'	3" thick - 59TCMX	39A	27,841	2.00	59TCMX	1,282	4.00	70MSS-1	.18	21,794	x		-	-	-	-	45SY	9.00	51M	10.00	None
FARC 60-121	Windsor - Deposit (McClure @ Damascus)	3.2	24'	8'	3" thick - 59TCM	39A	147,399	1.00	59TCM	9,879	3.00	70MSS-1	.15	221,284		x	55	2.50	59C	2.00	45SY	10.00	51M	10.00	Resurface 1970
FISH 61-11	I-505, 5 Mile Point - Broad Ave. (State Hospital Hill)	2.4	24'	8'	3" thick - 59TCMX	39A	67,947	1.20	59TCMX	7,727	4.50	61	2.00	2,716	x		-	-	-	-	45SY	8.80	51M	9.00	Resurface 1970
FARC 61-168	Hales Eddy - Hancock (Deposit By-Pass)	3.1	24'	8'	4" thick - 59W	39A	110,736	1.75	59W	14,593	3.75	70MSS-1	.16	252,675		x	55S	3.00	-	-	45SY	9.00	51M	11.00	Resurface 1970
FARC 62-15	Binghamton City - Conklin Ave.	4.2	24'	8'	3" thick - 59W	39A	77,909	1.50	59W	4,088	4.50	70MSS-1	.19	85,899	x		-	-	-	-	-	-	51M	11.00	None
FARC 62-226	Fenton (Service Roads)	2.6	24'	2'-4'	3" thick - 59WW	39AX	12,101	1.80	59WW	1,915	5.50	67DX	.17	37,442	x		-	-	-	-	45SY	9.00	51M	9.50	Median shoulder rebuilt 1969
FIC 63-24	I-505, 5 Mile Point - Broad Ave., Brewer St. Ext. - Himmans Cors.	3.2	36'	9'	4" thick - 59WW	4	27,688	3.50	59WW	4,387	8.50	67DX	.13	78,413		x	558	.20	-	-	45SX	9.00	51M	10.00	Resurface 1970
FAC 63-27	City Binghamton Art. - Collier St. Br. - Court St.	3.3	24'	10'	3" thick - 59WW	4	9,387	3.50	59WW	1,097	10.00	67DX	.13	18,800	x		-	-	-	-	-	-	51	11.00	Resurface 1967
FISH 64-1	I-505, Chenango River - Himmans Cors.	3.3	24'	8'	4" thick - 59WW	4	51,366	4.00	59WW	7,803	8.00	67DX	.13	139,446		x	558	.20	-	-	45SM	11.00	51M	11.00	None
FISH 65-4	I-505, Himmans Cors. - Castle Creek	3.3	24'	8'	4" thick - 59WWA	4	50,093	3.90	59WWAX	8,803	5.75	67DX	.16	192,727	x		-	-	-	-	45SN	10.00	51M	10.25	Patched 1967, 1968, 1969
FISH 65-7	I-505, Castle Creek - Whitney Point	2.3	24'	8'	4" thick - 59WWA	4	63,883	3.10	59WWB	14,654	5.00	67DX	.14	264,278	x		55S	.25	60S	.25	45SN	10.00	51M	11.00	Patched 1969, 1970
FISH 65-30	I-505, Whitney Point - Cortland Co. Line (Plant Mix)	4.4	24'	10'	4" thick - 3" 45SN, 1" 51M	4	56,822	2.40	-	-	-	-	-	-	x		-	-	-	-	45SN	11.30	51M	11.65	None
RC 65-96	Binghamton - Brandywine Ave. Ext.	3.5	24'	8'	4" thick - 59WWA	4	1,108	5.00	59WWA	2,898	5.15	67DX	.22	52,200	x		-	-	-	-	-	-	51M	9.40	None
FASH 66-11	Tioga Co. Line - Johnson City (Plant Mix)	4.7	24'	10'	4" thick - 3" 45SN, 1" 51M	4	63,828	5.00	-	-	-	-	-	-	x		-	-	-	-	45SN	10.50	51M	11.50	None
FARC 66-149	Fenton (E. B. ML) Chenango - Tow Path (E. B. Old Rte. 7) Port Crane - Sanitaria Springs (W. B. Old Rte. 7)	4.2 4.0 4.1	24'	10'	4" thick - 3" 45SN, 1" 51M	4	37,635	4.25	-	-	-	-	-	-	x		-	-	-	-	45SN	10.50	51M	11.00	None
RC 67-22	No. Fenton - Belden, Pts. 1 & 2	4.5	20'	7'	5" thick - 4" 59WWB, 1" 51X	4	13,874	5.00	59WWB	6,527	7.50	67DX	.20	113,060	x		60S	.20	-	-	45SP	12.50	51	12.25	None
FARC 67-68	Owego - Binghamton (Vestal Parkway)	4.7	24'	6'	5" thick - 4" 59WWB, 1" 51X	4	11,631	8.00	59WWB	11,900	10.00	67DX	.16	214,200	x		60S	.35	60SX(9)	.80	45SP	12.00	51	11.50	None
RC 67-113	Conklin	4.8	24'	10'	5" thick - 4" 59WWB, 1" 51AC	4	13,810	5.00	59WWB	3,600	10.00	67DX	.25	64,540	x		60S	.30	-	-	45SP	12.00	51M	12.00	None
CRC 68-11	Vestal Ave. By-Pass	4.7	24'	8'	5" thick - 4" 45SP, 1" 51X	4	2,300	10.00	59WWB	800	25.00	67DX	.16	14,400	x		60S	.35	-	-	45SP	13.00	51X9	15.00	None
RC 68-47	Windsor - Deposit (Truck Lane, Tuscarora)	3.7	24'	4'	4" thick - 3" 45SP, 1" 51X9	4	4,503	5.00	-	-	-	-	-	-	x		60S	.50	-	-	45SP	17.00	51X9	20.00	None
																									1969 - 1970 29 Shoulder miles I-81, $203. per mile for materials and salary 76 Shoulder miles other roads, $238. per mile for materials and salary (\$.19 per sq. yd. surface treatment - materials and salary)

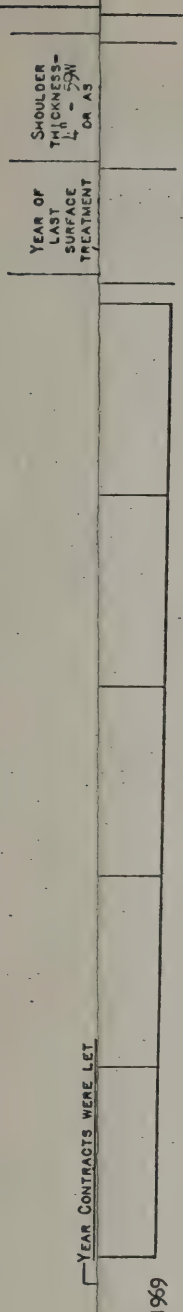
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
BUREAU OF SOIL MECHANICS

SHOULDER EVALUATION
DATA SUMMARY SHEET
BROOME COUNTY
FIGURE D

PREPARED BY: [signature]
DRAWN BY: Norman D. Johnson
CHECKED BY: S. J. Lange

APPROVED OCT. 5 1970
[signature]
DIRECTOR

REGION No. 9
COUNTY Broome
DRAWING NO. SM 17000



CONTRACTS RATED IN MAY, 1970 BY:

J. E. CHRISTOPHER	REGIONAL SOILS ENGINEER
J. CLINTSMAN	REGIONAL MAINTENANCE ENGINEER
C. BROADBENT	RESIDENT ENGINEER
J. R. SULLIVAN	ASS'T. RESIDENT ENGINEER
WM. LANGHORST	M. O. CONSTRUCTION ENGINEER
T. J. O'CONNOR	M. O. MAINTENANCE ENGINEER
E. J. LANGE	M. O. SOILS ENGINEER
E. M. REYNOLDS	M. O. SOILS ENGINEER

O = INDIVIDUAL RATINGS

X = AVERAGE OF INDIVIDUAL RATINGS

* = LESS THAN 6' SHOULDER

NOTE: THE PROJECT DATA HAS BEEN PLOTTED ACCORDING TO THE CONTRACT LETTING YEAR. THE CONTRACT NUMBERS ARE SHOWN IN CHRONOLOGICAL ORDER. THE MONTH OF LETTING CANNOT BE SCALED ON THE DRAWING.

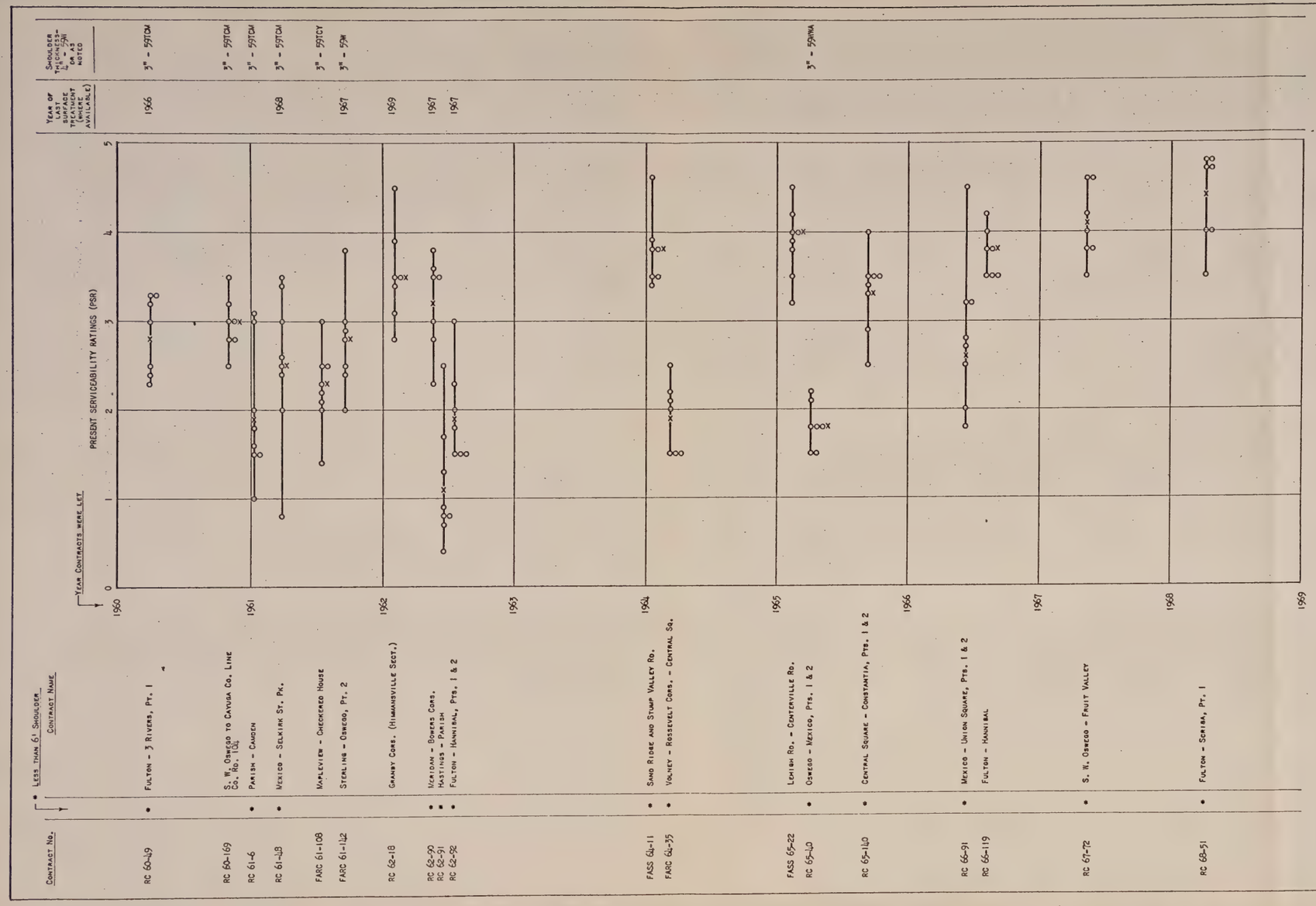
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
BUREAU OF SOIL MECHANICS

SHOULDER EVALUATION
OSWEGO COUNTY
FIGURE E

PREPARED BY: Edward M. Reynolds
DRAWN BY: Norman W. Jansen
CHECKED BY: E. J. Lange

APPROVED Oct. 5 1970
Wm. P. Robinson
DIRECTOR

REGION No. 3
COUNTY Oswego
DRAWING NO. SM 1708E



Contracts rated in May, 1970 by:

J. E. Christopher	Regional Soils Engineer
J. Clintsman	Regional Maintenance Engineer
C. Broadbent	Resident Engineer
J. R. Sullivan	Ass't. Resident Engineer
Wm. Langhorst	M. O. Construction Engineer
T. J. O'Connor	M. O. Maintenance Engineer
E. J. Lange	M. O. Soils Engineer
E. M. Reynolds	M. O. Soils Engineer

o - Individual Ratings

x - Average of Individual Ratings

• - Less than 6' shoulder

Note: The project data has been plotted according to the Contract letting year. The contract numbers are shown in chronological order. The month of letting cannot be scaled on the drawing.

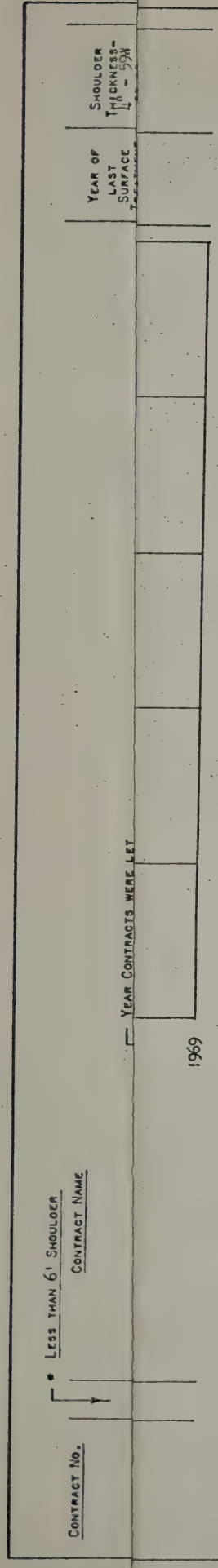
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
BUREAU OF SOIL MECHANICS

SHOULDER EVALUATION
OSWEGO COUNTY
FIGURE E

PREPARED BY: [signature]
DRAWN BY: [signature]
CHECKED BY: [signature]

APPROVED Oct. 5 1970
[signature]
DIRECTOR

REGION No. 3
COUNTY Oswego
DRAWING NO. SM 1708E



Contracts rated in June, 1970 by:

Wm. Peak	Ass't. Regional Soils Engineer
R. Pearce	Regional Maintenance Engineer
B. Ginther	Region Engineer
Wm. Langhorst	M. O. Construction Engineer
J. Bereza	M. O. Maintenance Engineer
F. Gorczyca	M. O. Soils Engineer
E. M. Reynolds	M. O. Soils Engineer

o = Individual Ratings

x = Average of Individual Ratings

* = Less than 6' Shoulder

Note: The project data has been plotted according to the Contract letting year. The Contract numbers are shown in chronological order. The month of letting cannot be scaled on the drawing.

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
BUREAU OF SOIL MECHANICS

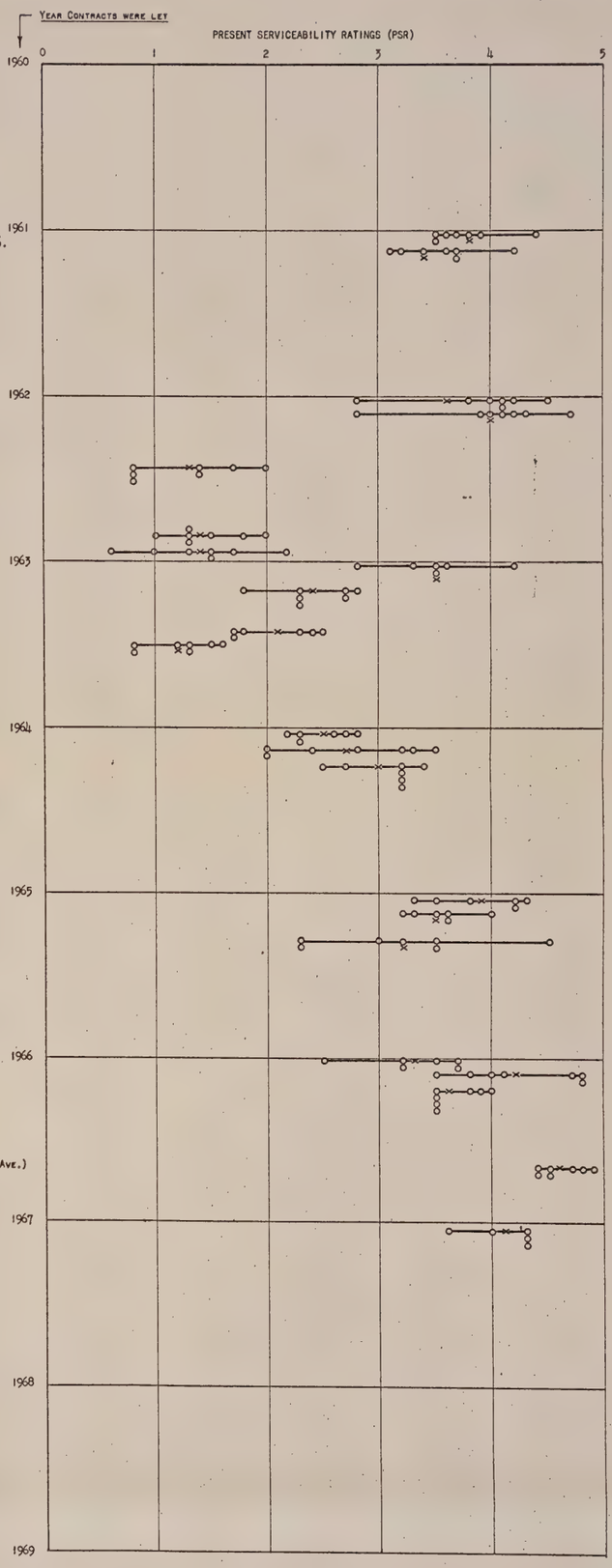
SHOULDER EVALUATION
ALBANY COUNTY
FIGURE F

PREPARED BY: Edward M. Reynolds
DRAWN BY: Norman W. Jensen
CHECKED BY: E. J. Lange

APPROVED Oct. 5 1970
Wm. P. Hofmann
DIRECTOR

REGION No. 1
COUNTY ALBANY
DRAWING NO. SM 1708

Contract No.	* Less than 6' Shoulder	Contract Name	Year of Last Surface Treatment (where available)	Shoulder Thickness - 4" - 59W or as noted
FAC 61-6		Crosstown - Washington Ave. - Krumkill Rd.	1967	3" - 59TCM
FASH 61-24		Delmar By-Pass	1966	
FIC 62-3		I-540, Route 9W - Green St.		1" - 51M, 4" - 59W
FIC 62-3		I-540, Route 9W - Green St.		
RC 62-86	*	Indian Fields - Dormansville		
RC 62-200	*	Westerlo - Dormansville		
FARC 62-208	*	Slingerlands - Albany		
FISH 63-1		Everett Road Ext.		
FARC 63-22	*	Wolf Hill - Berne		
RC 63-82	*	Voorheesville - New Salem		
RC 63-91	*	Coeymans - Indian Fields		
FASS 64-7		Karner Rd. - Vly Rd.		
FARC 64-10		Osborne Cors. - Schenectady Co. Line		
FASH 64-13		Slingerlands By-Pass		
FIC 65-10		I-504, Fuller Rd. - Everett Rd.		
FARC 65-19		Louden - Crescent		
RC 65-59	*	Selkirk - Coeymans		
FIC 66-2		I-502, I-504, Fuller Rd. - Thruway		3" - 59WW, 1" - 51MS
FASS 66-10		Long Lane Co. Rd.		
RC 66-29	*	Glenmont - Feura Bush		
RC 66-138		Glenmont - Feura Bush (Relocated Elm Ave.)		3" - 59WW, 1" - 51MS
SH 67-15		Washington Ave. Ext.		3" - 45SP, 1" - 51MA



Contracts rated in June, 1970 by:

Wm. Peak	Ass't. Regional Soils Engineer
R. Pearce	Regional Maintenance Engineer
B. Ginther	Region Engineer
Wm. Langhorst	M. O. Construction Engineer
J. Berea	M. O. Maintenance Engineer
F. Gorczyca	M. O. Soils Engineer
E. M. Reynolds	M. O. Soils Engineer

o - Individual Ratings
x - Average of Individual Ratings
* - Less than 6' Shoulder

Note: The project data has been plotted according to the contract letting year. The contract numbers are shown in chronological order. The month of letting cannot be scaled on the drawing.

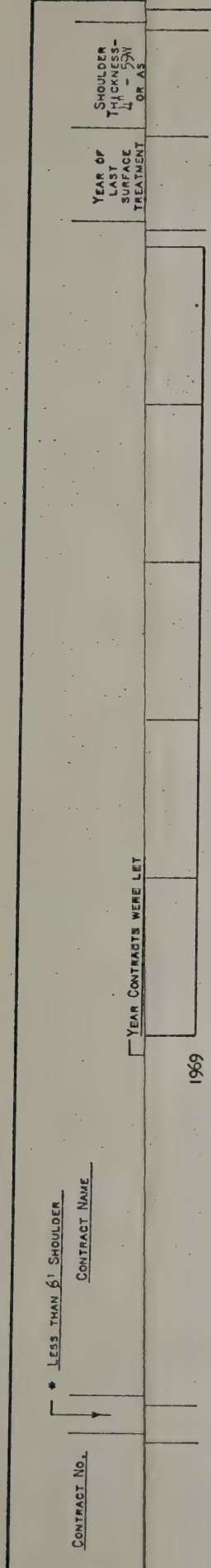
Prepared by: [signature]
Drawn by: [signature]
Checked by: [signature]

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
BUREAU OF SOIL MECHANICS

SHOULDER EVALUATION
ALBANY COUNTY
FIGURE F

Approved Oct. 5 1970
[signature]
Director

Region No. 1
County Albany
Drawing No. SM 1700



Contracts rated in August, 1970 by:

T. M. Mannix	Regional Soils Engineer
F. Dunbrook	Regional Maintenance Engineer
Wm. Langhorst	M. O. Construction Engineer
A. Dickinson	M. O. Maintenance Engineer
J. N. Currier	M. O. Soils Engineer
E. M. Reynolds	M. O. Soils Engineer

O = Individual Ratings

X = Average of Individual Ratings

* = Less than 6' Shoulder

Note: The project data has been plotted according to the Contract letting year. The Contract numbers are shown in chronological order. The month of letting cannot be scaled on the drawing.

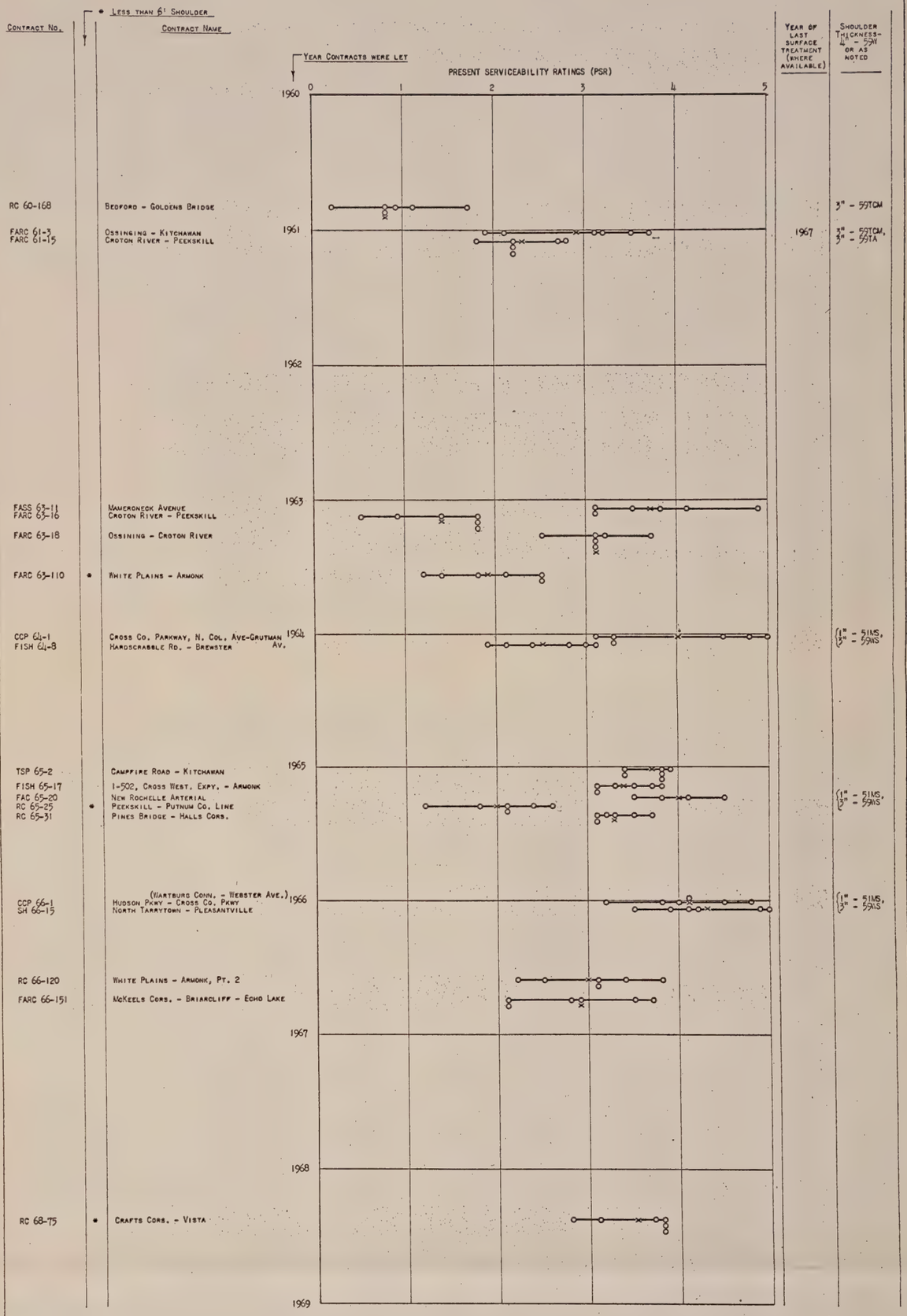
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
BUREAU OF SOIL MECHANICS

SHOULDER EVALUATION
WESTCHESTER COUNTY
FIGURE G

PREPARED BY: Edward McReynolds
DRAWN BY: Norman W. Jensen
CHECKED BY: E. J. Lange

APPROVED Oct. 5 1970
Wm. P. Hofmann
DIRECTOR

REGION No. 8
COUNTY Westchester
DRAWING NO. SM 1708G



Contracts rated in August, 1970 by:

T. M. Mannix — Regional Soils Engineer
F. Dunbrook — Regional Maintenance Engineer
Wm. Langhorst — M. O. Construction Engineer
A. Dickinson — M. O. Maintenance Engineer
J. N. Currier — M. O. Soils Engineer
E. M. Reynolds — M. O. Soils Engineer

O - Individual Ratings
X - Average of Individual Ratings
* - Less than 6' Shoulder

Note: The project data has been plotted according to the contract letting year. The contract numbers are shown in chronological order. The month of letting cannot be scaled on the drawing.

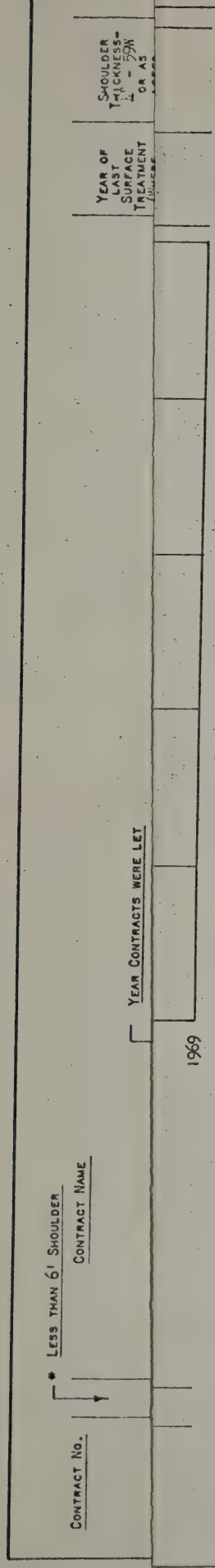
State of New York
DEPARTMENT OF TRANSPORTATION
BUREAU OF SOIL MECHANICS

SHOULDER EVALUATION
WESTCHESTER COUNTY
FIGURE G

Prepared by: [signature]
Drawn by: [signature]
Checked by: [signature]

Approved Oct. 5 1970
[signature]
Director

Region No. 8
County Westchester
Drawing No. SM 1708G



Contracts rated in August, 1970 by:

W. Green	Regional Soils Engineer
C. R. Russell	Regional Maintenance Engineer
Wm. Langhorst	M. O. Construction Engineer
R. C. Babbitt	M. O. Maintenance Engineer
T. J. Novak	M. O. Soils Engineer
E. M. Reynolds	M. O. Soils Engineer

O - Individual Rating

X - Average of Individual Ratings

* - Less than 6' Shoulder

Note: The project data has been plotted according to the Contract letting year. The Contract numbers are shown in chronological order. The month of letting cannot be scaled on the drawing.

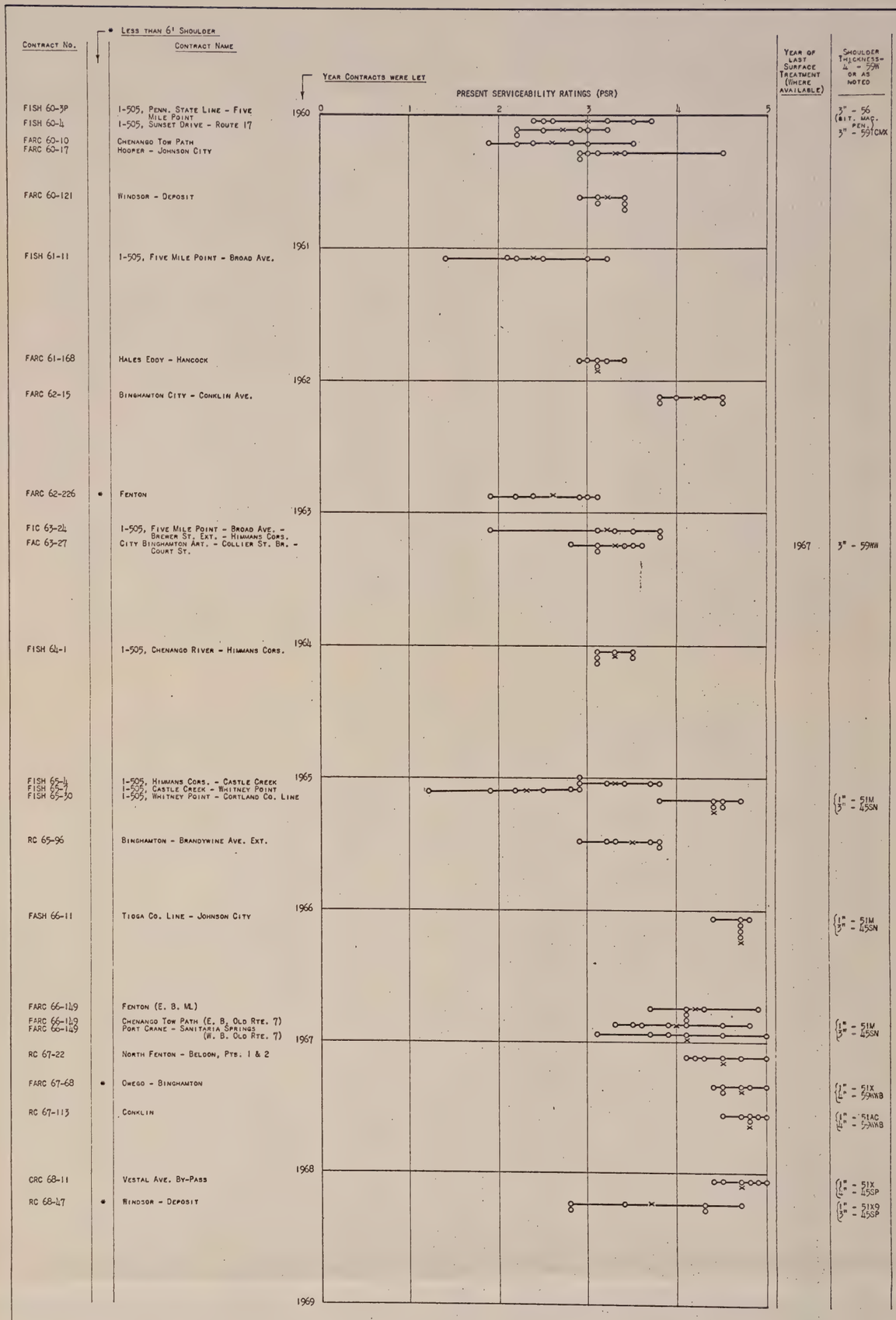
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
BUREAU OF SOIL MECHANICS

SHOULDER EVALUATION
BROOME COUNTY
FIGURE H

PREPARED BY: Edwin M. Reynolds
DRAWN BY: Norman W. Jensen
CHECKED BY: E. J. Lange

APPROVED Oct. 5, 1970
Wm. P. Hofmann
DIRECTOR

REGION No. 9
COUNTY Broome
DRAWING NO. SM 17081



Contracts rated in August, 1970 by:

W. Green — Regional Soils Engineer
C. R. Russell — Regional Maintenance Engineer
Wm. Langhorst — M. O. Construction Engineer
R. C. Babbitt — M. O. Maintenance Engineer
T. J. Novak — M. O. Soils Engineer
E. M. Reynolds — M. O. Soils Engineer

O - Individual Rating
X - Average of Individual Ratings
* - Less than 6' Shoulder

Note: The project data has been plotted according to the contract letting year. The contract numbers are shown in chronological order. The month of letting cannot be scaled on the drawing.

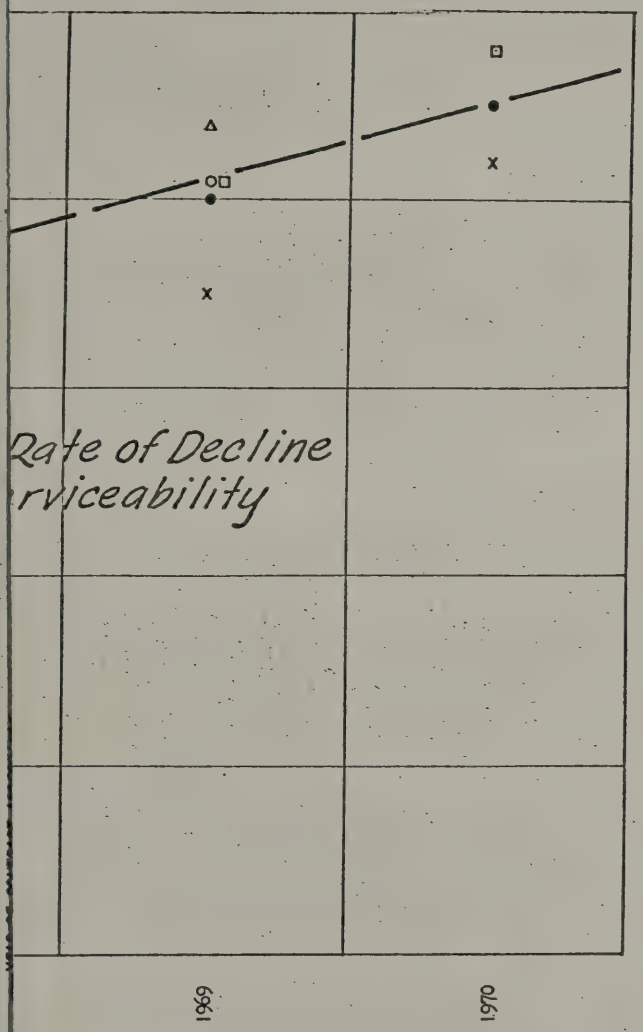
State of New York
DEPARTMENT OF TRANSPORTATION
BUREAU OF SOIL MECHANICS

SHOULDER EVALUATION
BROOME COUNTY
FIGURE H

Prepared by: [signature]
Drawn by: [signature]
Checked by: [signature]

Approved Oct. 5, 1970
[signature]
Director

Region No. 9
County Broome
Drawing No. SM 17081



LEGEND

- O - Albany County
- □ - Broome County
- Δ - Oswego County
- X - Westchester County
- ● - Average of 4 Cos.

NOTES:

1. Only shoulders composed entirely of Item 59N are included in this plot.
2. All points are plotted according to the year of Contract Acceptance.

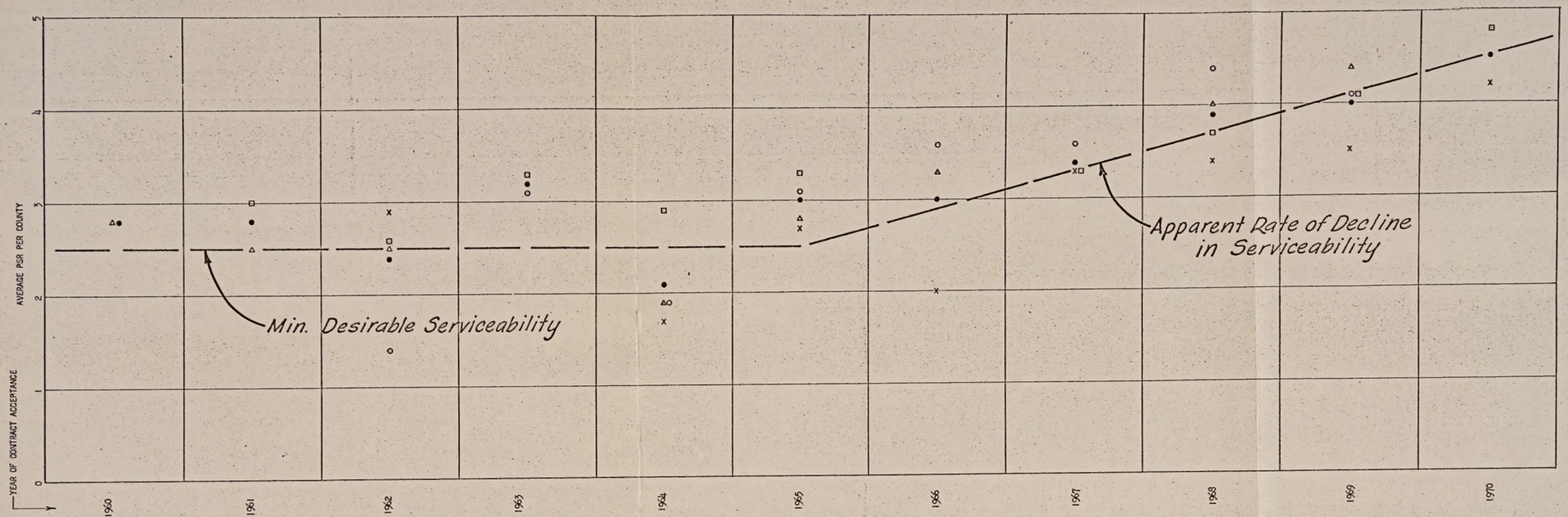
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
BUREAU OF SOIL MECHANICS

SHOULDER EVALUATION
AVERAGE COUNTY RATINGS VS TIME
ALBANY, BROOME, OSWEGO & WESTCHESTER COUNTIES
FIGURE J

PREPARED BY: E. M. Reynolds
DRAWN BY: Norman W. Jensen
CHECKED BY: E. J. Lange

APPROVED Oct. 14 1970
Wm. P. Hofmann
DIRECTOR

REGION No. 1, 3, 8 & 9
COUNTY AS SHOWN
DRAWING NO. SM 1708 J



LEGEND

- O - Albany County
- □ - Broome County
- Δ - Oswego County
- X - Westchester County
- ● - Average of 4 Cos.

NOTES:

1. Only shoulders composed entirely of Item 59M are included in this plot.
2. All points are plotted according to the year of Contract Acceptance.

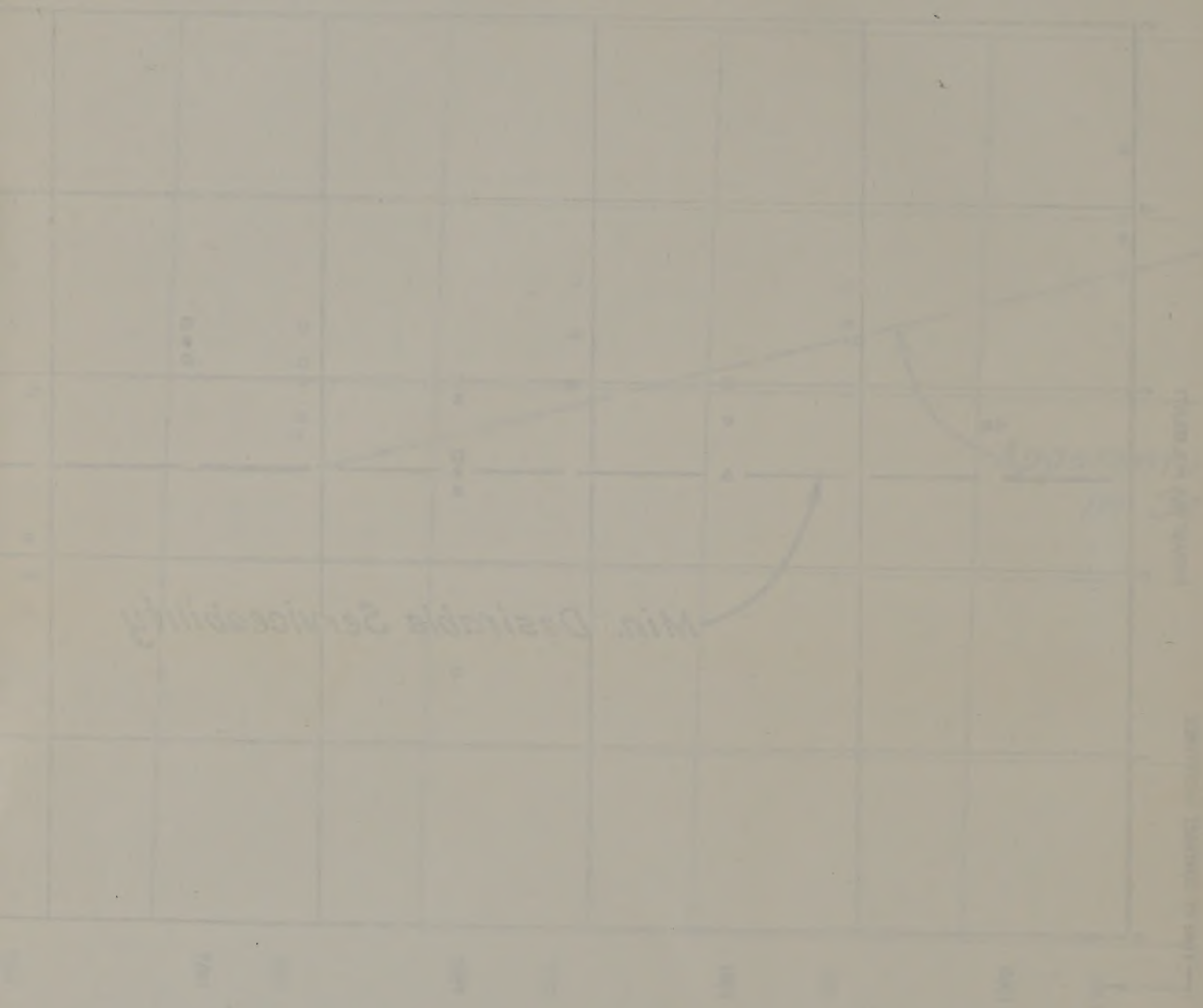
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
BUREAU OF SOIL MECHANICS

SHOULDER EVALUATION
AVERAGE COUNTY RATINGS VS TIME
ALBANY, BROOME, OSWEGO & WESTCHESTER COUNTIES
FIGURE J

PREPARED BY: E. M. Reynolds
DRAWN BY: Norman W. Jensen
CHECKED BY: E. J. Lange

APPROVED Oct. 14, 1970
Wm. P. Hofmann
DIRECTOR

REGION No. 1, 3, 8 & 9
COUNTY AS SHOWN
DRAWING NO. SM 1708 J



00997
LRI